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DISTANCE LEARNING FOR THE COMMONWEALTH'S FUTURE

A Plan for an Educational Telecommunications Network

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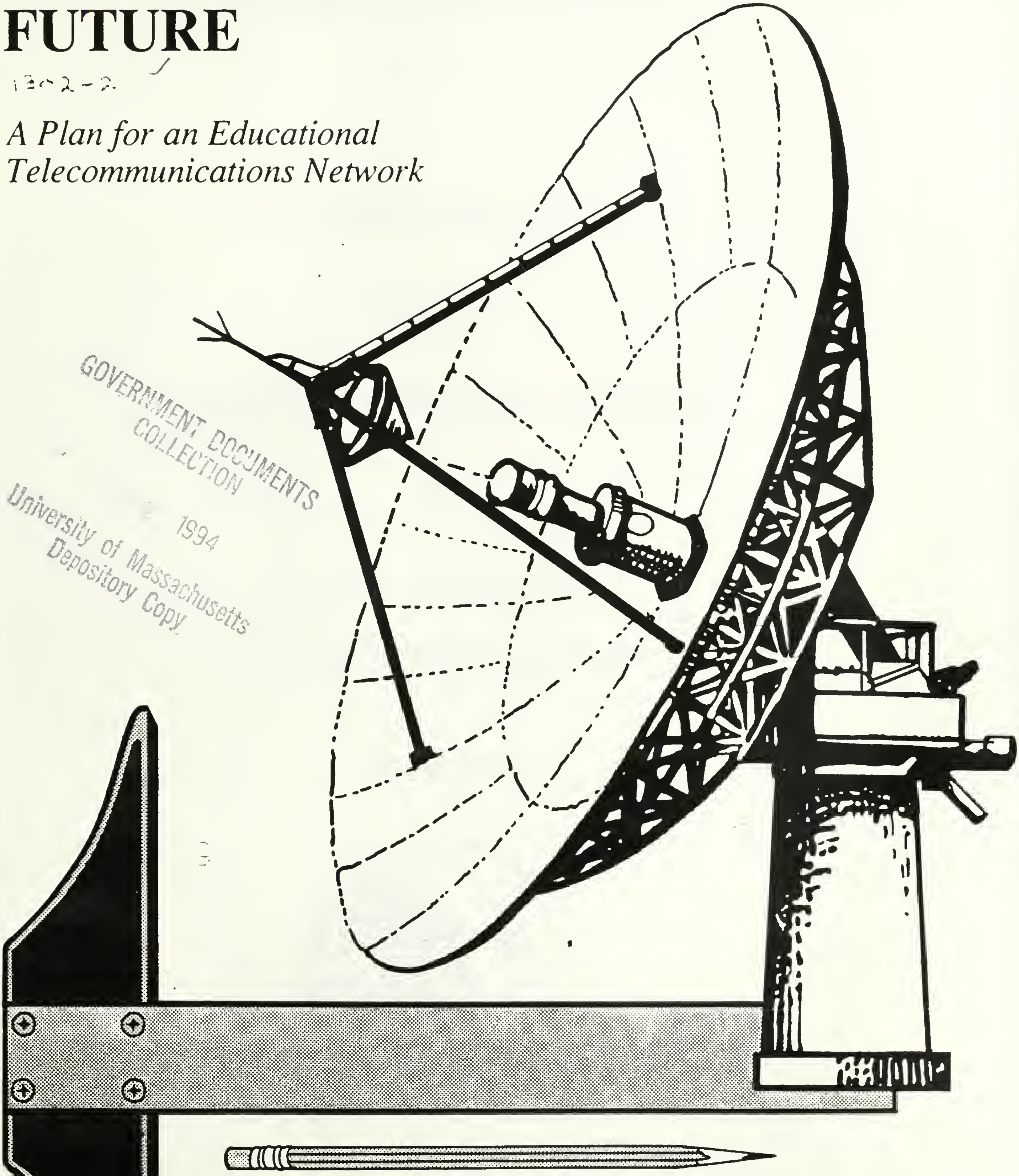

42/88

THE MASSACHUSETTS CORPORATION
FOR EDUCATIONAL TELECOMMUNICATIONS

Massachusetts Corporation for
Educational Telecommunications

DISTANCE LEARNING
For The
COMMONWEALTH'S FUTURE

A Plan for an Educational Telecommunications Network

Spring 1989

MCET

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Summary

The Massachusetts Corporation for Educational Telecommunications (MCET) submits the following Plan for the development of a statewide educational telecommunications network in accordance with Chapter 560 of the Acts of 1982 as amended.

The purpose of the proposed network is to address the state's critical need for improved education in an increasingly technical and professional economic environment. The network will provide students, teachers and workers throughout the Commonwealth with greater access to high-quality learning resources.

The Massachusetts economy – which has led the nation into the information age – depends on a well-educated workforce. To the extent that the Commonwealth lacks workers with adequate mathematical, science, technical and language skills, its ability to sustain a successful economy is at risk.

Despite an abundance of outstanding educational resources in Massachusetts, many of our children cannot get the courses they need, and many adult learners in the labor force lack access to continuing education and job training. Educational institutions – faced with fiscal constraints, declining enrollments and a shortage of qualified teachers – find it increasingly difficult to provide the expanding range of courses that students need.

Clearly, the challenge we face is to facilitate the sharing of the unparalleled resources that reside in our colleges and universities, research laboratories, and industries – and to make them accessible to the major portions of the population they rarely reach. As has been demonstrated in other states, and on a limited basis in Massachusetts, telecommunications can be an effective and cost-efficient way to meet this challenge. Through *distance learning*, students can have access to courses not otherwise available, teachers can update their training, and workers can obtain the skills they need in today's demanding economic environment.

The MCET network will allow students, teachers and workers to participate in *live, interactive instruction* originating at remote locations. At the same time, it will enable our educational institutions to expand their markets and reach new students. The network will employ the immense power of advanced telecommunications to overcome barriers of distance, to accelerate the dissemination of information and knowledge, to share resources and to begin to erase the vexing disparities of instructional quality in Massachusetts.

Over a five-year period, the proposed network will cost $21.1 million for development and operations. MCET projects raising $10.3 million of this in user fees, and seeks $12.6 million from the state over the five year period. As Governor Dukakis has noted, "While implementing these technologies in our schools may be expensive, the cost of not implementing them will be even higher."

Distance Learning: A Response To the State's Educational Challenges

> *The emerging technologies, combining computer, video, telephone, and television capabilities, will soon influence the way we all live, learn, and communicate. The military, government agencies, and the business world are already using these technologies extensively, especially for training. . . . While implementing these technologies in our schools may be expensive, the cost of not implementing them will be even higher.*
>
> *Governor Michael S. Dukakis*[1]

The Massachusetts Corporation for Educational Telecommunications (MCET) was created by the Legislature, through enactment of Chapter 560 of the Acts of 1982, to respond to critical educational needs affecting the state's economic development (see **Appendix 1**). In accordance with the provisions of Section 8 of that Act, as amended, MCET hereby submits the following plan for the development over a five-year period of a statewide educational telecommunications network.

MCET's Statutory Mission

MCET's legislatively mandated Purpose is to establish and operate a statewide telecommunications network linking private and public post-secondary educational institutions, school systems, libraries, health care institutions and other potential users. The legislature determined that such a network would:

- "Encourage and facilitate economies of scale and complementarity among institutions by providing a direct communication link for education, information, and data resource sharing;
- "Provide a means of delivering education and information to the home and community;

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[1] Holly Brady, "Bush and Dukakis: On Technology in the Schools, *Classroom Computer Learning*, Oct. 1988, pp. 28-29.

- "Contribute substantially to enlarging the pool of trained manpower essential to the economy of the Commonwealth by connecting educational institutions to public and private worksites; and

- "Effect cost savings and improvements in the many non-instructional applications of telecommunications."

The network proposed in this plan will substantially and effectively fulfill the basic purpose of MCET's enabling legislation.

Educational Problems Affect Massachusetts Economy

Although Massachusetts is noted for its educational resources, they are inaccessible to a great portion of the population. As a result, we are experiencing shortages in the skilled workers needed by our industries. MCET's research reveals that:

- Massachusetts is especially *dependent on a well-educated workforce*, particularly in mathematics, science and foreign languages. Between 1976 and 1984, high technology employment increased 67.7 percent, which was three times the overall rate of job growth. High technology provided 25 percent of new jobs during those years,[2] and should continue to provide one-quarter of new jobs through 1995.[3]

- *Declining enrollments and teacher shortages* have forced schools to reduce the number of courses available in math, science and foreign languages — the very subjects most crucial to our economy. By 1991, Massachusetts secondary school enrollment will have declined 37.5 percent from its 1976 high. At the same time, retirements and attrition will cause a teacher shortage by the early 1990s in the areas

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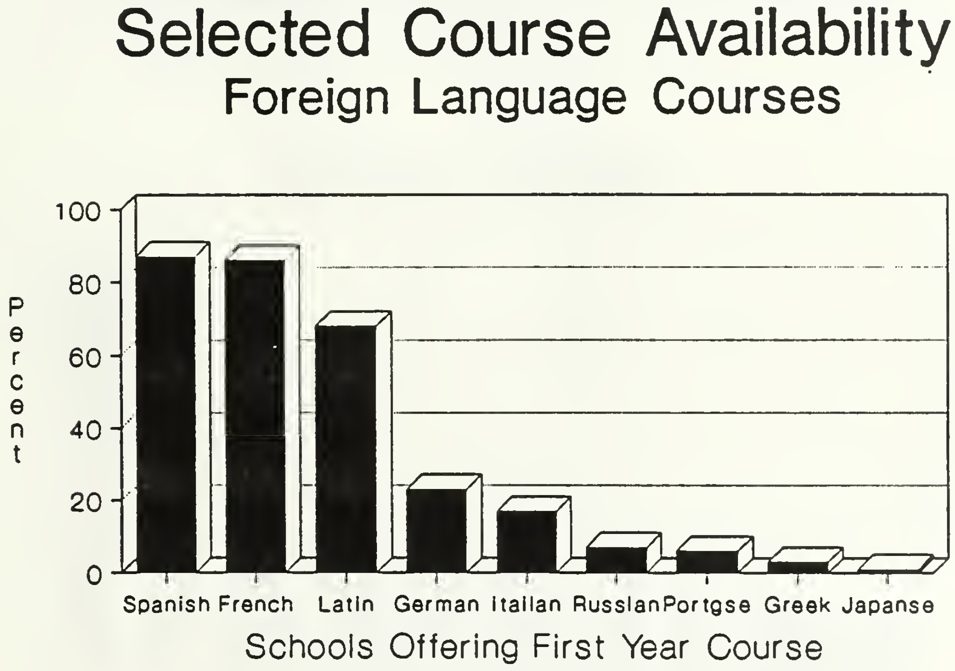
[2] Massachusetts Division of Employment Security, *High Technology's Impact on the Massachusetts Economy Since 1976*, November 1985, pp. 8, 2.

[3] Massachusetts Division of Employment Security, *High Technology Employment Development: An Employer Perspective*, November 1986, p. i.

of mathematics, general science, biology, chemistry, English, social studies and vocational studies.[4]

- As a result of these factors, *students do not have access to the courses they need.* During 1988, MCET surveyed public high school principals in the state's first comprehensive study of course availability. Of the 242 responding schools – an 80 percent response rate – only 23 percent offer German, 7 percent teach Russian, and only *two* schools (less than 1 percent) offer Japanese. Less than a third of the schools offer Advanced Placement courses in chemistry, physics or computer science. Moreover, principals expressed a strong need for advanced teacher training in teaching skills, administrative skills and educational technologies. (See **Figures 1 and 2**. Complete survey results are included as **Appendix 2.**)

Figure 1



Source: MCET Survey 1988

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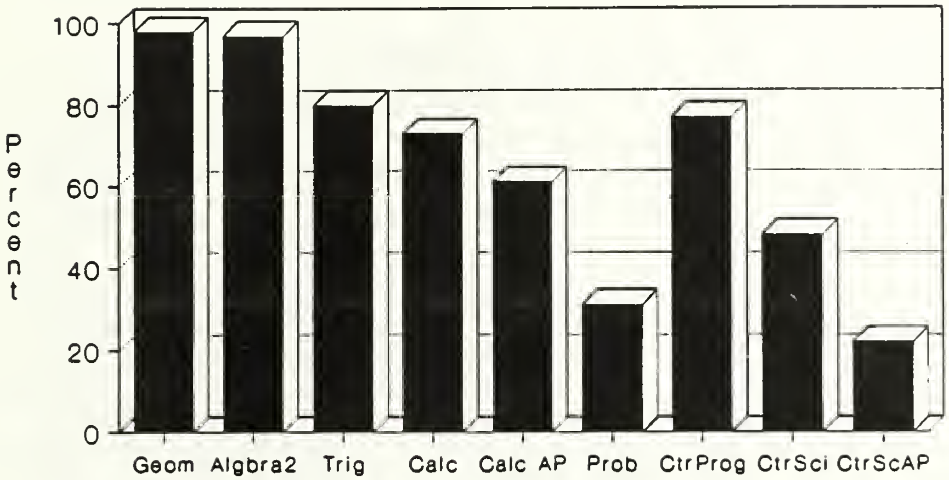
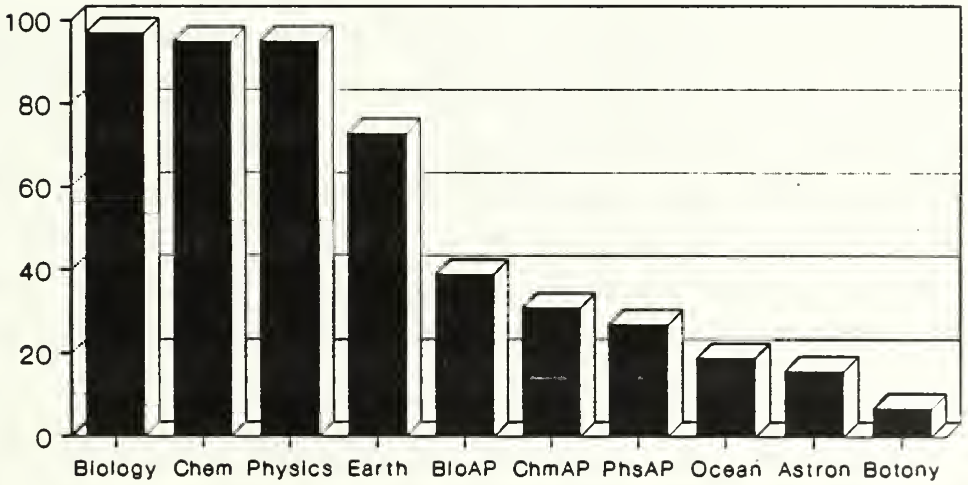
[4] Massachusetts Institute for Social and Economic Research, *Report on the Status of Teacher Supply and Demand in Massachusetts*, prepared for the Board of Regents, Department of Education, et al. (June 1987), Executive Summary, p. 5, 8.

Figure 2

Selected Course Availability
Mathematics Courses



Science Courses



Source: MCET Survey 1988

- Despite the presence of outstanding educational, scientific, medical and other learning resources in Massachusetts, *workers are often unable to obtain the continuing education or re-training courses* they need to keep up with advances in technology. According to an MIT report, "An engineer who graduated more than ten years ago will not have studied a number of important subjects that students are studying today."[5]

- At a time when Massachusetts has set for itself new goals for increasing foreign trade, the achievement of our students lags behind that of students in competing nations. Americans continue to score poorly on international tests in such areas as math and science. (See **Figure 3.**)

- Other states throughout the region and the nation have begun to use telecommunications effectively to deal with these problems. At least 31 states have made substantial financial commitments to educational telecommunications (see **Appendix 3**). Massachusetts has perhaps the most to gain from such investment, yet *the Commonwealth continues to lag behind the rest of the nation in the application of distance learning technology.*

Telecommunications Has Been Proven Effective in Education

Distance learning can respond to these critical educational problems. It can provide the range of courses that schools presently are unable to offer; it can help school districts upgrade teachers' knowledge and skills; it can provide on-site continuing education and worker retraining; and it can readily reach the isolated rural and urban schools where these problems are most severe. Furthermore, distance learning is cost-effective compared to the alternative of individual schools hiring teachers for low-enrollment courses, to the educational price of continuing to "do without" critical instruction, or to the social and economic cost of a workforce without adequate skills.

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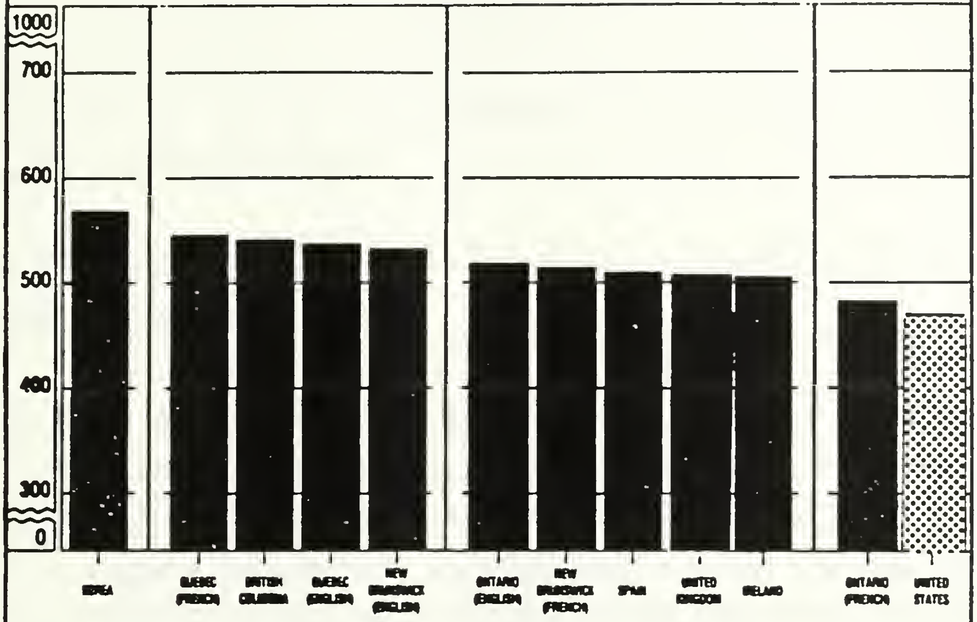
[5] Massachusetts Institute of Technology, Department of Electrical Engineering and Computer Science, *Lifelong Cooperative Education; Report of the Centennial Study Committee* (1982), pp. 40-44.

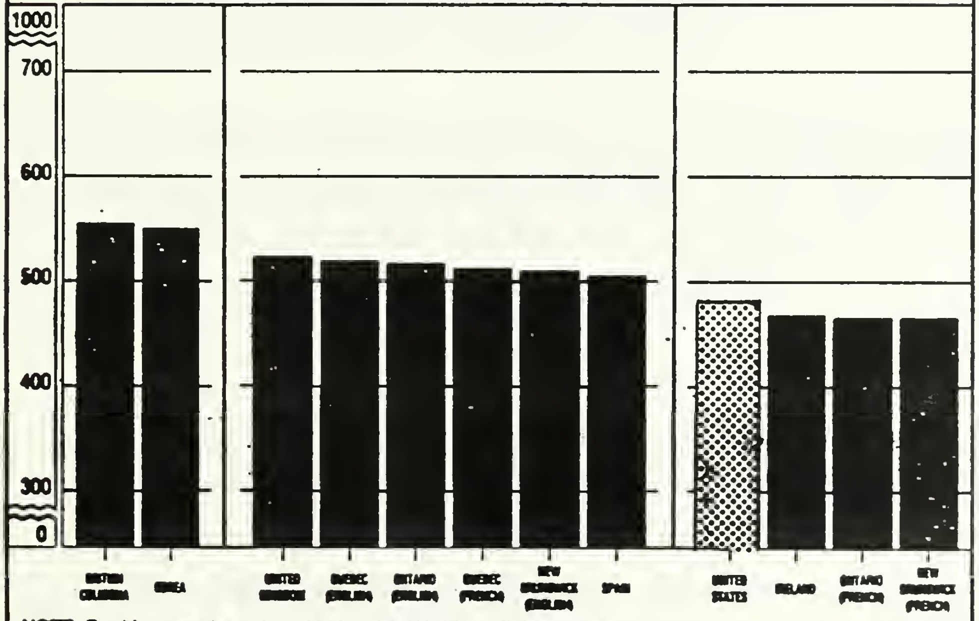
Figure 3

FEBRUARY 8, 1989 · EDUCATION WEEK 5

Average Mathematics Proficiency, Age 13



Average Science Proficiency, Age 13



NOTE: Rankings are based on 1000-point NAEP proficiency scale.

SOURCE: "A World of Differences", Educational Testing Service

Many institutions nationally and in Massachusetts have demonstrated the effectiveness of distance learning in meeting educational and economic challenges. For example, the Indiana Higher Education Telecommunications System connects more than 45 educational institutions and 100 off-campus locations, and enrolls at least 12,000 students in college-level degree and non-degree courses. Oklahoma uses satellite communication to deliver courses to over 130 schools and 70 higher education sites; courses include German, Advanced Placement Physics and Calculus, and Trigonometry.

Here in Massachusetts – although employed on a modest scale – distance learning has also proven its effectiveness.

- For several years, Northeastern University and Boston University have transmitted engineering courses to high technology companies using a microwave transmission service called Instructional Television Fixed Service (ITFS) and have recently begun to transmit via satellite. The University Massachusetts at Amherst mails videotapes of engineering courses and transmits courses by satellite. Through these means, hundreds of engineers have received advanced degrees or have taken "state-of-the-art" seminars at their worksites.

- ITFS systems have also been developed by Harvard University, Emerson College and Boston Catholic Television. The WGBH Educational Foundation, meanwhile, operates *two* satellite uplinks, as well as two microwave links between Boston and Springfield.

- Local school systems in several parts of the state have used telecommunications technology to overcome the problems resulting from low enrollments. Working with local cable systems and the Massachusetts Department of Education's Educational Technology Grants Program, neighboring school systems have been interconnected in the Lowell area, the western suburbs of Boston and southern Berkshire county. The South Berkshire Educational Collaborative, for example, has

developed a two-way connection among four high schools, and offers advanced language courses, advanced placement U.S. History and AP calculus.

MCET's Technical Assistance Program (TAP), now in its third year, has provided opportunities for dozens of Massachusetts institutions in various sectors to experiment with telecommunications for the delivery of educational services (see list of TAP projects, **Appendix 4**):

- Teachers have explored the range of new educational technologies available to them, using interactive satellite teleconferencing.
- Health care professionals have completed programs providing required continuing education credits through live telecourses.
- Physics teachers and students have shared ideas and experiences over a data network.
- Students have taken advanced mathematics courses from a leading university through an "electronic blackboard" and computer hookup.
- The Governor has met with students, educators and community leaders throughout the state on the problem of drug abuse, using a two-way video link.

These projects reveal a genuine interest in using distance learning and demonstrate the benefits that could occur on a larger scale with a dedicated statewide telecommunications network. Numerous Massachusetts educational, business and government leaders have recognized the benefits of such a network and expressed strong support (see **Appendix 5**).

However, the widespread and permanent use of distance learning in Massachusetts has been greatly retarded by dependence on severely limited existing telecommunications capacity. Because schools and other nonprofits cannot afford the telecommunications equipment, distance learning is used extensively only in the business sector, not in the many other sectors that could benefit. The interconnection of local schools depends on the availability and

cooperation of local cable systems and on funding from government sources, such as the Technology Grants Program, which has been cut substantially. MCET's TAP projects have been restricted by the limited availability and high cost of existing telecommunications capacity.

Telecommunications Environment Has Changed

The state demonstrated considerable vision in creating MCET. It foresaw the promise that modern communications technology holds for education and it charged MCET with creating a network that could bring new learning experiences to students and teachers separated by considerable distances. Because little video transmission capacity existed when Chapter 560 was enacted, the legislation's intent was for MCET to *build* that capacity.

Since then, many Massachusetts educational institutions have begun to invest in telecommunications equipment. Indeed, today the state's landscape is dotted with satellite uplinks, microwave towers and cable interconnects.

In light of these developments, MCET has refined its strategy for creation of a network. We now believe that a comprehensive learning network can be developed with far less capital investment than was anticipated in 1982. New telecommunications capacities exist, but their availability and capabilities are limited, and lack coordination and interconnection. Given MCET's mandate, and in light of the Commonwealth's current fiscal situation, MCET proposes the development of a comprehensive network through:

(1) Investing relatively modest sums for the acquisition and installation of satellite reception equipment in local communities;

(2) Leasing existing transmission capacities on the most cost-effective basis, with expenses to be reimbursed by user institutions; and

(3) Coordinating and integrating these diverse capacities into a coherent distance learning network that will serve the broader educational and economic needs of our state.

Thus, the MCET network plan will economically supplement, coordinate and integrate new and existing capacities to provide communications capabilities that are beyond the means of any single Massachusetts institution or consortium of institutions.

How the MCET Network Will Work

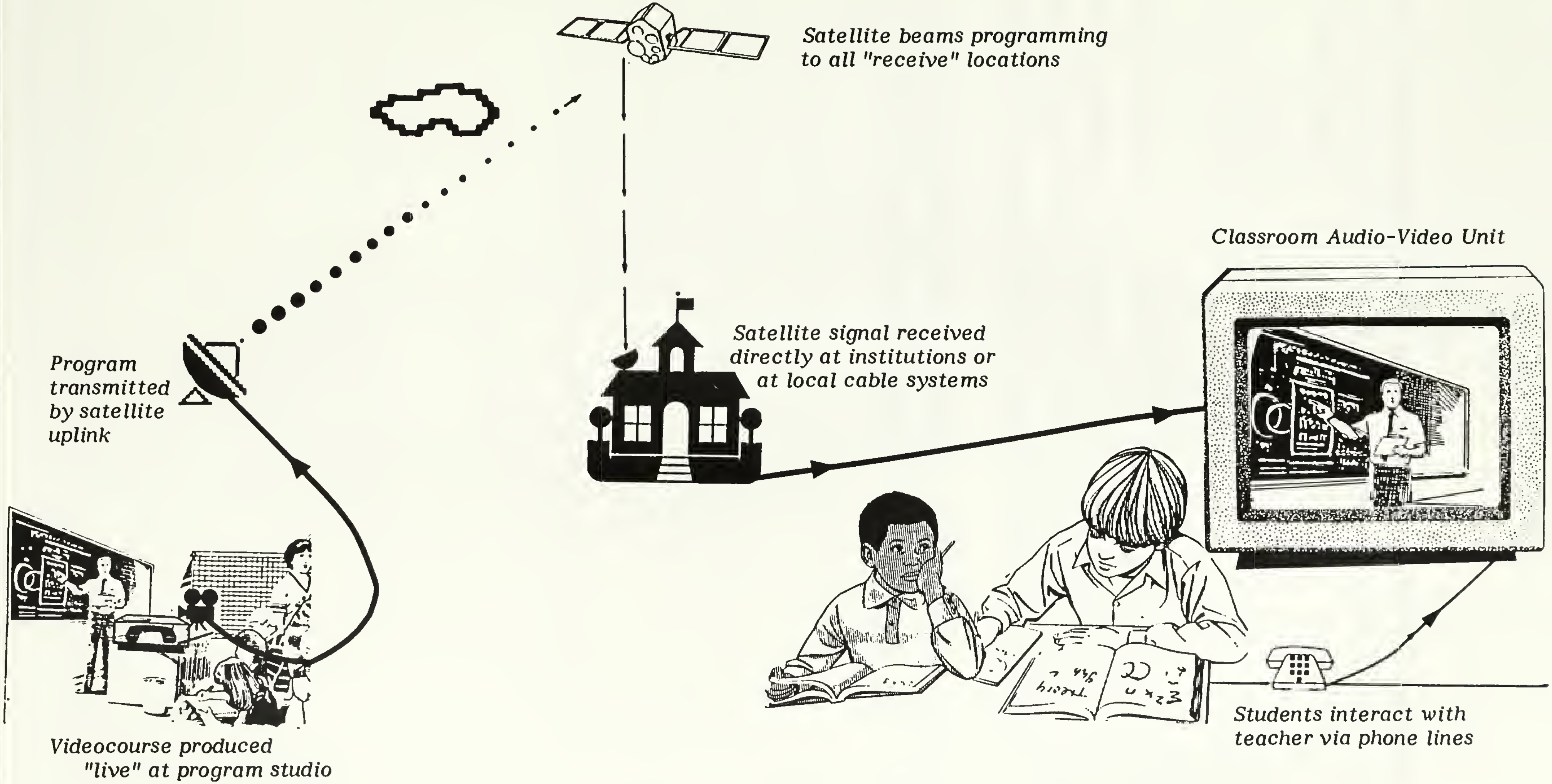
The MCET network will enable many institutions to *send out* live video courses and other educational services. It will enable schools and other institutional sites throughout Massachusetts to *receive and actively participate* in these services. The network will, to the greatest possible extent, use existing transmission facilities, cable television capacity and newly emerging telephone capabilities. (See **Figure 4**).

After a comprehensive examination of a wide range of technical options, MCET and its engineering consultants determined that satellite technology will permit the most cost-effective distribution of video programming to the largest number of sites. MCET seeks funds to expand existing video facilities in western Massachusetts to permit live program production and transmission of this programming via satellite. In eastern Massachusetts, MCET will secure access to existing satellite uplinks and studio facilities, based on the lowest available price. MCET will lease satellite transponder time, at discounted rates, to relay programming from various satellite transmission points directly to "receive" sites throughout the state.

MCET will place satellite receive equipment at cable television systems that are connected to schools and other critical institutions, or where this is not feasible, will place the equipment directly at institutional sites. MCET will also make available easy-to-use audio-visual classroom equipment, enabling students to see the programming and talk with the instructors.

To enhance the video distribution network, MCET will develop, beginning in

Figure 4 - ***How the System Will Work***


Satellite beams programming to all "receive" locations
Program transmitted by satellite uplink
Satellite signal received directly at institutions or at local cable systems
Classroom Audio-Video Unit
Videocourse produced "live" at program studio
Students interact with teacher via phone lines

Year 2, *local interactive networks* to enable schools in neighboring communities to share courses and a *data network* to allow participants to communicate with each other electronically.

MCET will purchase, at discounted rates, quality distance learning programming and services, addressing identified educational needs. At the same time MCET will work with the state Department of Education, the Board of Regents, individual institutions and potential funding sources to support the development of new programming by Massachusetts institutions. MCET will provide *support services* to both producers and users of distance learning resources, including conferences and workshops, technical assistance, and various publications.

The sections that follow contain detailed plans for programming and support services, marketing and management, and technical design for the proposed network.

Programming and Support Services

> *It will be virtually impossible to modernize our schools, to increase their efficiency and productivity, without a major application of technology to education.... [Yet] our public schools cannot undertake [such an effort] without government help.*
>
> *Albert Shanker*
> *American Federation of Teachers*[6]

During the initial year of operation, much of the programming carried on the network will be *acquired* from out-of-state and in-state sources. At the same time, MCET will provide *support services* to enable institutions to make effective use of distance learning and to assist those institutions that wish to develop new programming. In future years we expect the majority of programming on the network will be *locally produced* by Massachusetts institutions.

Providing Access to Existing Educational Programs

Through a *Program Acquisition Fund*, MCET will acquire currently available, high quality, interactive programming for use by schools, higher education institutions, health care and other sectors. Based on the needs expressed by network users, MCET will acquire existing programming at bulk discount rates. This initial programming, to be available at network inception, will give Massachusetts institutions an immediate opportunity to use and become familiar with distance learning services. It will serve, too, as the stimulus for the development of programming by Massachusetts organizations.

The following are examples of the types of programing that are currently available (a more complete list is contained in **Appendix 6**):

- The **TI-IN Network** is a private satellite service providing high school courses such as computer science, physics, and honors probability and statistics. The network also offers basic skills boosters, student

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[6] "Excerpts from the Open Letters to the Next President," *Classroom Computer Learning*, Oct. 1988, p. 32.

enrichment programs and in-service staff development programs for teachers.

- The **PBS Adult Learning Service** is a full program service developed in cooperation with the higher education community and targeted to college students. It provides college courses, lectures, workshops and seminars. The basic participation fee for a single college or university is $2500 per year, plus the cost of satellite receive equipment. Through a special purchase arrangement, MCET could acquire the service for each participating institution for $1500 per year.

- **HealthNET** is a continuing education series of live, interactive videoconferences for health care professionals, produced by the Area Health Education Center of Boston University Medical Center, distributed throughout Massachusetts through MCET's *Technical Assistance Program*. During the coming year, MCET has arranged to distribute this program nationally over The Learning Channel, a satellite program service. The proposed MCET network would enable many more health centers in Massachusetts to receive the program – not just those connected to cable systems that receive The Learning Channel.

Beginning in Year 2, MCET plans to provide its members with a data communication service. The Program Acquisition Fund will be used to provide access to existing *computer database services*, providing students with state-of-the-art research experiences. Services such as CompuServe, Dialog, BRS or VU/Text offer students the ability to instantly search through libraries of reference materials, including journal abstracts, periodicals indices, and full texts of back issues of major newspapers.

At the request of members, MCET will acquire these services for 20 to 30 percent *less* than institutions could individually, through special collaborative price reductions offered by many programmers. During Year 1, MCET will fully subsidize program services and will make them available to all network members. *In future years, members will be expected to pay the discounted cost for these programs.*

Fostering the Development of Educational Programming

In addition to existing programming, many local institutions are in various stages of distance learning development. MCET will assist in the development of such programming, but in keeping with its statutory restrictions will not produce programs itself. The programs described below are only *samples* of the types of programs that could be carried over the network. As MCET's network becomes operational, we expect that grant funding as well as user fees will support development of programs such as these.

MCET's *Technical Assistance Program (TAP)*, has revealed a growing interest, need and enthusiasm among Massachusetts institutions for using distance learning technology to meet educational goals. In the last fiscal year, TAP implemented 27 separate teleconferences, serving over 1300 individuals and 68 institutions. Many of these projects can be expanded for statewide distribution. (See list of TAP projects, **Appendix 4**.) Examples of TAP projects:

- **Telecourse Forum** provided higher education faculty and administrators with examples of distance learning opportunities, focusing on the Annenberg/CPB Collection of video courses.

- **Introduction to Calculus A** was a full semester course distributed by Harvard University Extension School to students at six sites using audioconferencing, computers and "electronic blackboards."

- **The Physics Forum** is a computer bulletin board that allows physics teachers to communicate with each other to compare notes, improve curriculum and collaborate on projects.

- **AIDS Education Series** provided information about AIDS education to higher education deans of students and to high school teachers, principals and school committees.

Other examples of programs that could be readily developed for a statewide network can be found in MCET's *Northeast Star Schools Program* proposal. In the spring of 1988, MCET received 31 program proposals for K-12 learning from 24 Massachusetts institutions to include in our application to the U.S. Department

of Education. Although MCET's Star Schools proposal did not receive funding, these applications indicate the range of excellent and imaginative shared learning opportunities that could be available through an educational telecommunications network. The proposed distance learning courses include (a complete list is included as **Appendix 7**):

- **Discrete Math,** proposed by Northeastern University, would provide hands-on learning opportunities to high school students in solving real-life problems that require mathematical solutions. Under this proposal, a teacher conducts a live video session and interacts with students via computer and "electronic blackboard." A series of workshops increase the teachers' knowledge in both the content area and pedagogy of discrete math.

- **Maximizing the Museum's Mission: New Directions in Elementary Science** would be offered by Boston's Museum of Science. This project "transports" the museum's respected teacher training program to schools throughout the region. Thirty live, interactive training sessions would be transmitted, accompanied by kit materials. A daily broadcast would introduce the museum to teachers and students.

- **Distance Learning Foreign Language Institute** was proposed by the University of Massachusetts at Amherst to improve foreign language instruction. Distance learning courses provide *teachers* with methods and materials to improve instruction in French, German, Latin, Portuguese and Spanish, and provide *students* with interactive telecourses supplemented by international programming such as news, talk shows and special telecasts.

Support Services

MCET will provide the following *support services* to ensure network users make the most effective use of distance learning services and to assist institutions in developing new programming:

- MCET will conduct *conferences and workshops* to provide information and training on the development and use of distance learning resources, to discuss policy and pedagogical concerns, and to allow review of model projects. Small group workshops will focus on specific technical skills, such as telecourse planning, production and

marketing, use of on-line data services and the integration of distance learning into the classroom.

- MCET will publish a *newsletter and directory*, and will maintain an on-line database to keep members informed of available programming and services, as well as foster communication among members.

- The Corporation will conduct an *on-going needs assessment* to determine the most pressing educational needs that can be met through distance learning. The results of such surveys will assist members in identifying other institutions with similar needs, thus encouraging joint resource development and acquisition.

- MCET will provide *technical support* in the production of distance learning programming to assist those institutions needing help in some aspect of video production.

- MCET will work with public and private funding sources (e.g. foundations and corporations) to encourage new *sources of support* for distance learning. MCET will begin working with potential funding sources during network construction.

Business Plan

This section provides a "Business Plan" for the MCET network. The section describes our marketing strategy, governance and management structure.

Marketing Plan

The Market for MCET Services. Chapter 560 created MCET to serve post-secondary educational institutions, school systems, libraries, health care institutions, business, industry and government. Over the past several years, MCET has conducted several studies to identify the *most pressing* education needs in the Commonwealth that could be addressed through telecommunications. We have concluded that a statewide distance learning network should initially focus on serving two critical educational needs in Massachusetts:

- **Math, Science, and Foreign Languages.** The need to improve K-12 education math, science, and foreign languages is well-documented. Because of declining enrollments, teacher shortages, and tight budgets, many Massachusetts school systems find it difficult to offer a broad range of courses in these subjects, particularly advanced placement classes. A statewide distance learning network would help solve this problem by allowing the Commonwealth to share its considerable resources among school districts across the state, and by providing opportunities for teachers to upgrade their knowledge and skills.

- **Adult Learners in the Knowledge Economy.** A distance learning network could expand opportunities for adult learners, particularly professionals seeking advanced training in such fast-changing fields as engineering, computer science and health care. Also, MCET can provide opportunities for displaced workers to obtain retraining.

MCET's Place in the Market. Although a wide variety of organizations offer telecommunication services – including broadcast television, satellite, microwave and cable television – MCET will occupy a unique place in the market.

Unlike the others, MCET proposes to develop a coherent statewide *network* – an electronic system exclusively dedicated to the exchange of information and services

among educators and students. The electronic system will supplement existing services by linking and integrating capacities rather than replace, duplicate or compete with them. The network will permanently link an expanding number of institutions to improve access to education in the Commonwealth. MCET will facilitate these efforts by coordinating both the electronic system as well as network support services.

The concept of the MCET network is further illustrated by the membership structure that is planned. Simply stated, the electronic system will link network members. The resources and needs of the *network members* will continually define and re-define the network programming and services.

MCET's Membership Concept. In general, any Massachusetts institution or business is eligible to become a network member. Membership entitles an institution to the following benefits:

- Installation of equipment to enable the institution to receive MCET network programming through either a local cable television system or a satellite receive antenna;

- Installation of an integrated audio-visual unit and telephone line in designated classroom to permit interaction among students and teachers;

- Maintenance of network equipment and training in the use of the equipment;

- Ability to subscribe, at discounted rates, to telecourses, teleconferences and other distance learning services that respond to educational needs and priorities;

- Use of transmission and production resources at reduced or discounted rates;

- Use of electronic mail and other data communication services to maintain dialogue among members as well as to expand educational opportunities;

- Subscription to MCET newsletters, resource guides and other publications to enhance communication among network members;
- Reduced fees for conferences and workshops to encourage and improve the quality of distance learning on the network.

Members will pay a one-time network access fee and an annual membership fee. For non-profit institutions the one-time access fee is $2000 per classroom, payable over two years, and the annual membership fee is $360 per classroom. For businesses, the one-time access fee is $8000 for one classroom, $2500 for each additional classroom; the annual membership fee is $2000 per classroom. These fees compare favorably with those charged by other distance learning networks throughout the country (see **Appendix 6**).

Securing Network Members. MCET is keenly aware of the potential pitfall of establishing an electronic system while neglecting to attract an adequate number of system users. The Corporation has identified a total market of approximately 5,000 institutions. As reflected in the budget proposed in this Plan, MCET aims at securing 565 members in the first five years of network development. The Corporation will focus its initial marketing efforts on Massachusetts institutions that are either currently involved in some form of distance learning or have formally considered establishing distance learning programs.

Appendix 7 identifies 209 Massachusetts institutions that collaborated on 31 program applications submitted to MCET last Spring, when MCET was developing its Northeast Star Schools Program proposal. The applications represent innovative distance learning programs for K-12 mathematics, science and foreign language instruction or teacher training. The collaborating institutions have already demonstrated their need and interest in using distance learning services in these critical subject areas. These 209 institutions represent the first tier of MCET's initial marketing effort.

In addition, during the past three years MCET has provided services to 68 institutions through its Technical Assistance Program (TAP). Many of these

projects focus on the educational needs of adult, professional learners. **Appendix 4** describes TAP projects that have been completed as of January 1989. Institutions that participated in these projects have deliberately chosen distance learning to address their educational problems. These TAP participants also fall within the first tier of MCET's initial marketing effort.

Although the institutions noted above have expressed a need for and interest in a statewide educational telecommunications network, MCET will not limit its marketing efforts to them alone. As previously stated, any Massachusetts institution or business is eligible to become a network member. Information about the network will be sent to the state's 2620 public and private schools, 124 institutions of higher learning, 724 health care institutions, 163 major government agencies, 320 libraries and cultural institutions, and 897 of the largest businesses.

MCET recognizes that the first year of operations will be the most critical. As an incentive for institutions to join the network, the Corporation will provide programs acquired through the Program Acquisition Fund at no cost to network members. Institutions joining the network in the first year will also be exempt from the annual membership fee for that year.

Attracting members to the network is only one part of MCET's marketing plan. In addition, the Corporation recognizes the need to maintain membership and expand the network. The support services (described on page 18) will be the principal means of maintaining network membership. These include a regular needs assessment of network members, frequent conferences and workshops, publications and electronic mail, technical support in program development, and fostering new funding sources for distance learning.

Management Plan

The successful emergence of other information technologies indicates that three critical objectives must be satisfied if the proposed network is to function and be used effectively:

1. Network technology must be educationally suitable, affordable, transparent, expandable, and well maintained;

2. Network use requires planning, supervision, training, demonstration, and continual assessment; and,

3. Network administrative functions such as billing, accounting, and record keeping must operate efficiently, and must be understandable.

In planning the network, MCET has designated management qualifications, functions and activities to ensure that these objectives are met. Our management structure draws on the skills, experience and commitment of professionals who will staff the network, and on the professionals and organizations throughout the Commonwealth who will work closely with MCET.

MCET's Board of Directors – with statutory policy-making, financial and governance authority – will administer and operate the network through its Executive Director and staff. The activities of the network have been divided into three functional categories: Engineering Services, Operations and Development, and Administrative Services. A Deputy Director will manage the day-to-day operations of each of these functions. Contractually retained specialists will complement the skills of the staff and provide technical services in the field.

Governance and Advisory Functions

MCET Board of Directors. The MCET Board of Directors has legal and oversight responsibility for the network. Its statutorily designated and gubernatorially appointed members include presidents of public and private colleges and universities, the Chancellor of the Board of Regents of Higher Education, the Commissioner of Education, the Secretary of Economic Affairs, the President of the WGBH Educational Foundation, and other educational and business leaders.

The MCET Advisory Council. The gubernatorially appointed MCET Advisory Council consists of fifteen members broadly representative of economic sectors not currently represented on the MCET Board, such as teacher labor organizations, the Board of Library Commissioners, health care and legal professions, and higher education programs in medicine, education and engineering. The Advisory Council was created to assist the Board of Directors in assessing the telecommunications needs of the Commonwealth's institutions, and recommending programs and activities designed to respond to those needs.

(See MCET's enabling legislation, **Appendix 1**, and lists of Board of Director and Advisory Council members, **Appendix 8**.)

Programming Committee. The Programming Committee will be selected by and represent the network members (i.e. those institutions that use the network). The committee will advise MCET on matters related to programming priorities, standards, and selection.

Management and Staffing

The management and staffing pattern for the network has been defined through an analysis of network priorities, functions and activities. The resulting staffing pattern will ensure that:

- Network objectives are skillfully and competently addressed;
- There will be as much continuity as possible in staffing – from network development, through network implementation and expansion – with the incremental addition of new staff and the use of contractual specialists for short-term activities;
- The proper affirmative actions are taken to ensure equal employment opportunity to all persons without regard to race, gender, religion, and age.

The organizational chart for MCET network management appears on the following page. Resumes of the existing professional staff appear in **Appendix 9**.

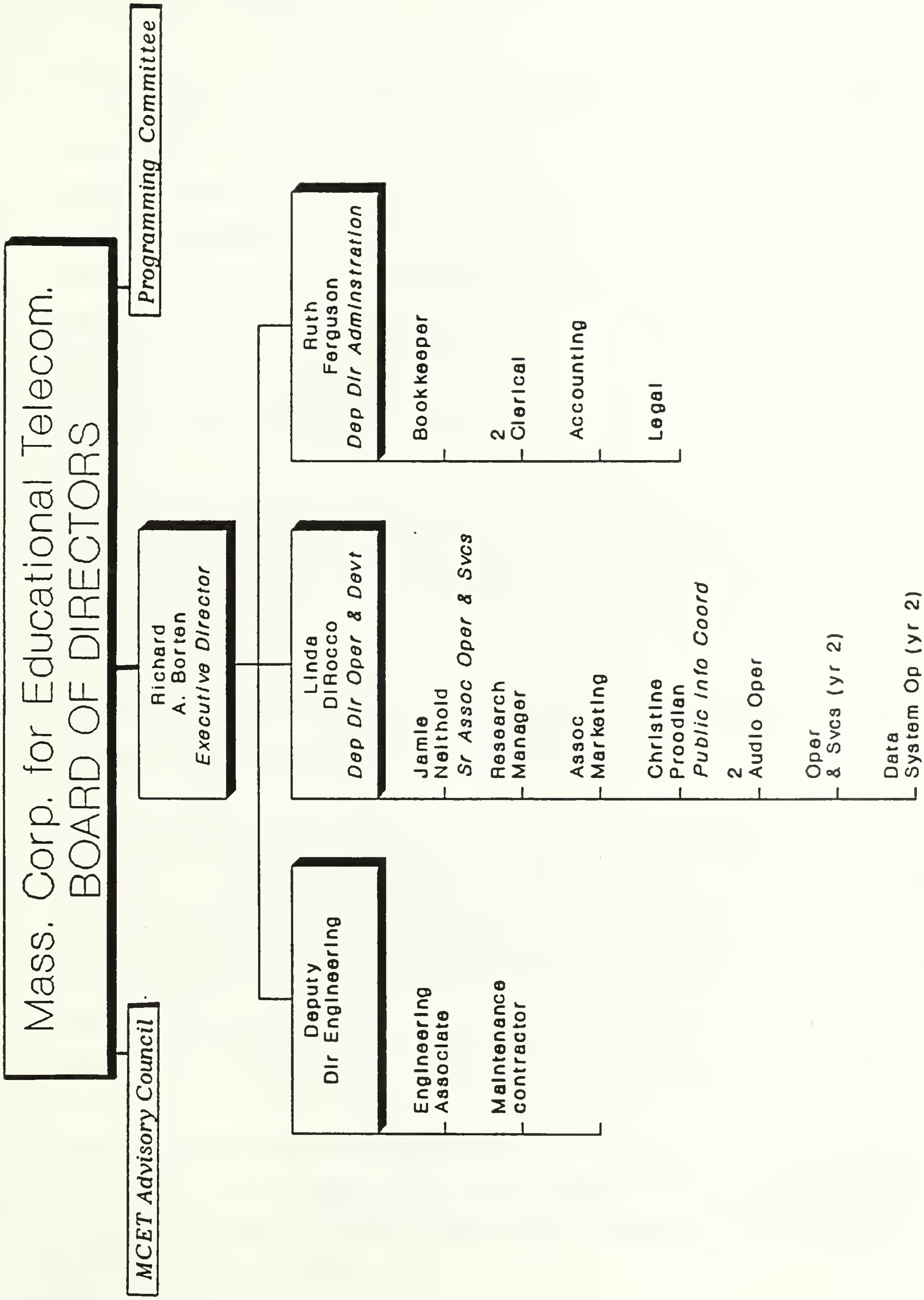
Executive Director. The MCET Executive Director, as the Corporation's Chief Operating Officer, will lead strategic planning efforts and oversee and coordinate all network functions. Named as MCET's first Executive Director in 1983, Richard A. Borten is responsible for all aspects of administration and program development, design and implementation. Mr. Borten has extensive experience in telecommunications administration and state and local government.

Engineering Services. The *Deputy Director for Engineering Services* will oversee the selection, installation, and maintenance of network equipment, and will establish and maintain technical standards for the network. This is a critical position which will be filled immediately upon the commitment of funds for network development. The Deputy Director for Engineering Services will be a professional engineer with a minimum of six years' experience in telecommunications engineering.

During Year 1, the Deputy Director for Engineering Services will hire and supervise an *Engineering Associate* to provide institutional training in the use of receiving and classroom equipment. The Director of Engineering Services will also contract with and supervise the performance of technical specialists on data network design, equipment installation, and equipment maintenance.

Operations and Development. The *Deputy Director for Operations and Development* will be responsible for network use and application, and will supervise staff and contractual specialists responsible for training, program acquisition, marketing, needs assessment, fundraising, scheduling, and program implementation. The Deputy Director for Operations and Development will also serve as the primary liaison to the MCET Advisory Council and the Programming Committee. Linda DiRocco, Deputy Director for Operations and Development, has supervised numerous projects involving the application of interactive learning technologies and has extensive experience training organizations in the use of

Figure 5



Mass. Corp. for Educational Telecom.
BOARD OF DIRECTORS
MCET Advisory Council
Programming Committee
Richard A. Borten
Executive Director
Deputy Dir Engineering
Engineering Associate
Maintenance contractor
Linda DiRocco
Dep Dir Oper & Devt
Jamie Neithold
Sr Assoc Oper & Svcs
Research Manager
Assoc Marketing
Christine Proodian
Public Info Coord
2 Audio Oper
Oper & Svcs (yr 2)
Data System Op (yr 2)
Ruth Ferguson
Dep Dir Administration
Bookkeeper
2 Clerical
Accounting
Legal

educational technology.

During the first year of network operations, the Deputy Director for Operations and Development will supervise the *Senior Associate for Operations and Services* who will be responsible for assisting with the development of locally produced distance learning resources, and for identifying existing distance learning resources potentially available through the Program Acquisition Fund. MCET's *Research Manager* will oversee needs assessment and provide overall professional research support. An *Associate for Marketing and Member Relations* will be responsible for bringing new members into the MCET network and maintaining contact with members. A *Public Information Coordinator* will assist with fundraising, public relations and the production of network publications.

In year two, an additional *Operations and Services Associate* will assist with the increased development of locally produced distance learning resources. A *System Operator* will be retained to manage MCET's electronic mail and data communications services.

To provide audio teleconferencing service, MCET will hire an *audio bridge operator* in Year 1 and a second operator in Year 3.

Administrative Services. The *Deputy Director for Administrative Services* will manage the Corporation's business affairs, including accounting, contract compliance, purchasing and cost containment, and ensuring compliance with federal and state administrative and fiscal requirements. Ruth Ferguson, MCET's Deputy Director for Administrative Services, holds an M.B.A. degree and has worked in a major cable television company in administration and planning. She has served as MCET's Controller and Chief Financial Officer since 1984.

The Deputy Director for Administrative Services will supervise a *Bookkeeper* and a staff of two *clerical* persons. The Deputy Director for Administrative Services will serve as liaison with the Corporation's accounting firm and with the corporation's legal advisors.

Technical Plan

The network we propose will enable the Commonwealth to maximize its educational resources, create new economies of scale and provide educational services that are not otherwise available. This section discusses the development, operation and integration of the following network components: origination facilities, transmission capacity, receive site capabilities, local interactive networks and data networks.

Origination Facilities

To facilitate the origination of distance learning services by Massachusetts institutions, MCET will make available facilities in eastern and western Massachusetts for the production and transmission of live, interactive programming. MCET will not produce programs itself, but will encourage production by Massachusetts institutions.

In *western* Massachusetts, MCET will:

- Develop a new production and editing studio to be housed at the University of Massachusetts at Amherst, which operates the only existing satellite uplink (transmitter) in western Massachusetts.
- Upgrade the university's uplink, currently fixed at one particular satellite, to enable the uplink to transmit to any Ku Band satellite.
- Install C and Ku Band satellite receiving facilities (downlinks) to receive existing satellite programming to relay over the network.
- In Year 2, install two-way microwave link between the university and Mt. Tom, providing two-way connections with Continental Cablevision Springfield (offering two-way connections to major Springfield institutions and schools) and the House of Representatives/WGBH Intercity Relay System (which links to Boston).
- In Year 2, install switching facilities to enable programming originating from any of the above sources or from the university's

other video facilities to be retransmitted over the satellite uplink or over the microwave link.

The above facilities will be owned, operated and maintained by the University, and available for use by any institution producing programming for transmission over the MCET network for a reduced fee.

In *eastern* Massachusetts, MCET will utilize the many *existing* production and uplinking facilities. MCET will secure use of these facilities on the most cost-effective basis, and provide access to institutions wishing to originate programming. MCET will lease a video connection between Lowell and Boston, to enable program producers in the Lowell area to transmit live programming over uplinks in Boston. MCET will also purchase two sets of *portable microwave equipment* to permit live program origination from sites near the existing uplinks.

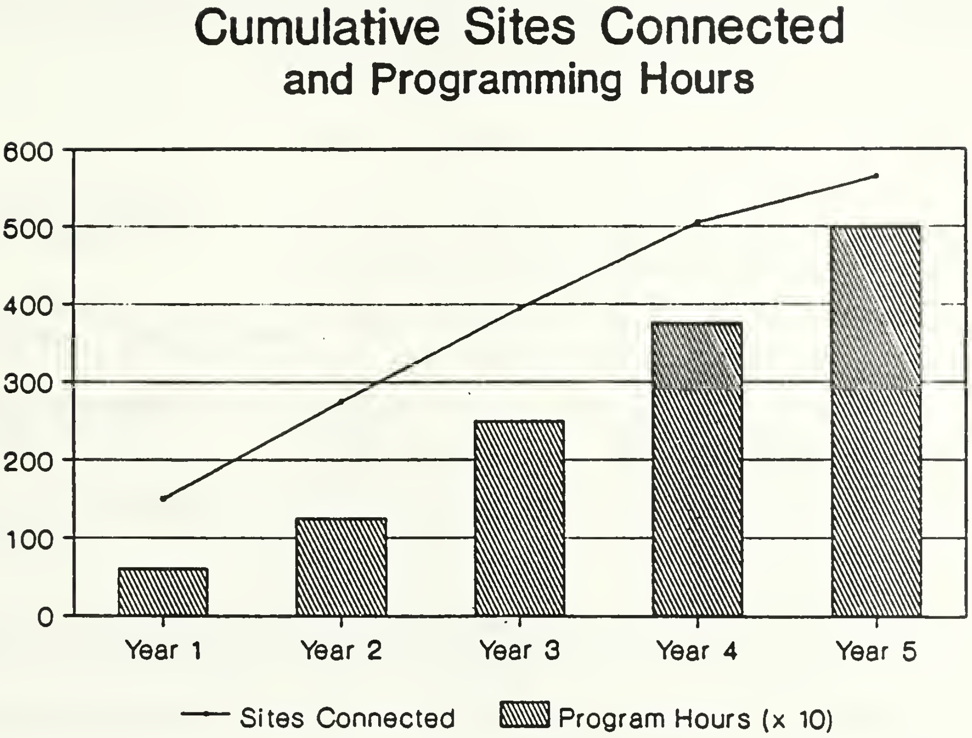
MCET expects that as the network develops, institutions with their own production facilities will want to build connections to an uplink to allow them to transmit live programming directly from their site.

Transmission Capacity

Satellite transponders relay television signals from uplinks to receiving facilities, or downlinks. MCET has been offered shared use of a satellite transponder currently used by an educational network in a neighboring state. Under a proposed shared-use agreement, the transponder would be available at under $200 an hour, which is about half the price users would have to pay for transponder capacity for occasional use. MCET would make this transponder time available to educational programmers at cost. MCET projects leasing the following numbers of hours (see **Figure 6**):

	Year 1	Year 2	Year 3	Year 4	Year 5
Hours:	600	1250	2500	3750	5000

Figure 6



MCET will purchase a state-of-the-art audioconferencing system and will lease sufficient numbers of "800" telephone lines to enable students throughout the state to participate in audioconference interaction without incurring long-distance phone charges.

Receive Capabilities

Wherever possible, MCET will place satellite downlinks for the reception of network programming at cable television systems, thus permitting distribution of this programming to many institutions throughout a community, as well as to homes. Where local cable capacity is not available or affordable, downlinks will be located directly at the participating institutions. MCET will own and maintain these satellite facilities. **Table 1** provides a schedule for the connection of network receive sites.

Table 1: Receive Site Connections

	Year 1	Year 2	Year 3	Year 4	Year 5	Total
Downlinks installed at cable systems	25	25	10	0	0	60
Institutional sites connected to cable systems*	50	75	70	60	60	315
Downlinks installed at institutional sites	100	50	50	50	0	250
Total sites connected during year	150	125	120	110	60	565

*Based on connecting an average of 2 institutions to each new cable system plus one additional institution to each old cable system.

MCET will provide to each member institution one standardized audio-visual classroom package, including video monitor and telephone talkback equipment, and a dedicated telephone line in one classroom.

Local Interactive Networks

Beginning in Year 2, MCET will develop *local interactive networks* providing *two-way video* connections between schools in contiguous communities. These networks will permit the sharing of courses among neighboring school systems, and will be most appropriate for courses that require very small classes and much interaction, complementing MCET's statewide system. Developing these systems will typically require interconnecting neighboring cable systems, using point-to-point microwave, fiber optics, or leased telephone company lines. Funding for these networks is *not* part of the budget request to the state; rather MCET will seek in-kind contributions from cable companies and other private carriers and funding from other public and private sources.

Approximately two such networks will be developed during Year 2, while planning commences for networks to be developed in subsequent years. Five networks will be built per year during years 3, 4 and 5.

Data Network

MCET will initiate a *data network* during Year 2 that will permit all institutions using MCET video services to communicate with each other. The data network will enable students and teachers to interact during classes, send electronic mail outside of class hours, and gain access to major national and local databases for research. The data network will also allow MCET network members to communicate with each other and with MCET about network programming and services.

During Year 1, a Data Network Consultant will determine the most effective technical options for data communication. MCET may either obtain its own minicomputer and software or lease services of an existing data communication service. For transmission of data, MCET may purchase services from a telephone carrier, a commercial data network such as Telenet or Tymnet, or an educational network such as the Higher Education Communication Network operated by the Board of Regents. Participating institutions can obtain access to the data network through the same telephone lines employed for audio interaction. Users will be expected to purchase their own terminal or microcomputer.

Budget

This section provides an overview of the five-year budget for network development and operation. A detailed budget explanation is provided as **Appendix 10.**

As shown in the five-year budget spreadsheet that follows, the total cost for network development and operations over the five-year period is $21.1 million. MCET anticipates receiving approximately half of this amount from network users, and will seek state funding of $12.6 million.

Because user revenues increase each year, the funding needed by the network through state appropriations *decreases* each year, from $3.1 million in Year 1 to $2.1 million in Year 5. We note that the $3.1 sought for Year 1 is actually *less* than the $4.0 million previously submitted as MCET's Fiscal Year 1990 Budget Request.

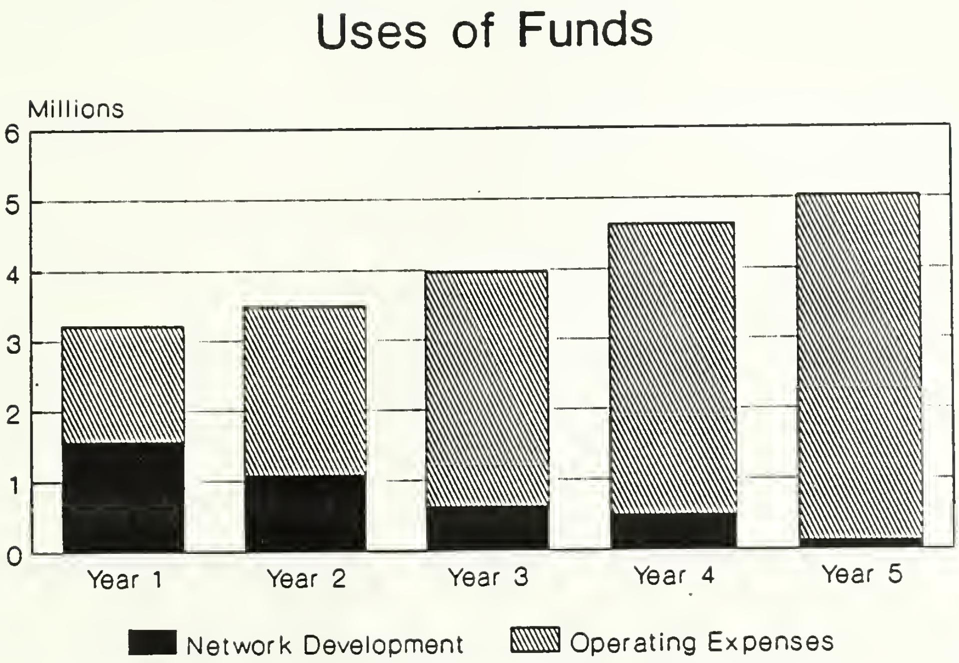
Uses of Funds

Funds are needed for both network development and ongoing operating expenses. Network development costs are concentrated in the early years. Operating costs increase each year, as a result of greater numbers of network users and increased amount of services (see **Figure 7**).

Operating expenses include: personnel, contractual services, general and administrative, telecommunications leases and the Program Acquisition Fund. Operating costs are $1.7 million in Year 1, increasing to $4.9 million by Year 5. The greatest portion of operating expenses by Year 5 falls within the telecommunications lease category – including satellite transponders, WATS lines and uplinking charges. *Most* of these charges are reimbursed by network users. Additionally, beginning in Year 2, the Program Acquisition Fund is fully reimbursed by network users.

√

Figure 7



The majority of the $4.5 million budget for network development will be expended in the first two years. These costs are primarily associated with providing capacity for the state's institutions to receive and interact with network programming. Two million dollars is sought for satellite receiving equipment at institutional sites and cable systems. An additional $1.1 million is designated for integrated audio-visual equipment to enable students to interact with teachers at remote locations. Other costs include $622,000 to complete program origination facilities in western Massachusetts, $62,000 for audioconferencing facilities, $26,000 for a data communications system and $604,000 for replacement parts.

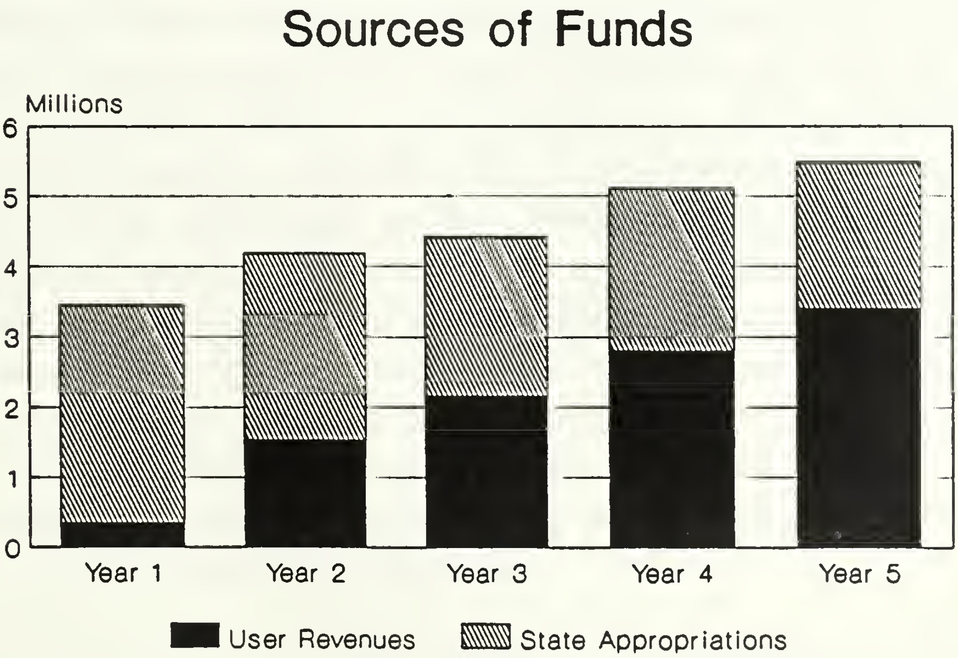
Sources of Funds

Each year, an increasing portion of funds will be obtained from network users (see **Figure 8**). User revenues fall into three categories: *Membership fees* cover the approximate cost of the classroom audio-visual equipment and annual on-site

maintenance. *Transmission revenues* are generally calculated to reimburse MCET for the actual out-of-pocket costs of transmission. *Program Acquisition Fund* revenues, beginning in Year 2, will pay for the actual cost of program acquisition.

MCET's cash flow assumes that half of a given year's user revenues will be available to cover MCET expenses during that fiscal year; the remainder will be available the following year. This assumption has determined MCET requirements for state funding each year. It is noteworthy that the need for state funds decreases significantly over time. Funding for the state network should be viewed as an *investment* by the Commonwealth that will provide rewards to the state well into the future. .

Figure 8



Additional Sources of Funds and In-Kind Contributions

Commitment of state resources for the MCET project will make it possible to leverage additional resources from public and private sources, resulting in a benefit to Massachusetts that will far exceed the costs to the state.

In addition to the revenues projected on the spreadsheet, MCET anticipates securing additional (non-state) support for the network, including federal funds, corporate and foundation donations and in-kind donations. These contributions will provide capabilities to the network in addition to those described in this Plan. Such enhancements include a "feeder network" to transmit programs from originating institutions to the various uplinks, production facilities in eastern Massachusetts and other parts of the state, technology resource centers that will provide needed support in the development of educational resources, and funding for program development.

For several years, MCET has worked closely with the Massachusetts congressional delegation in efforts to secure federal funding for a Massachusetts educational network. During last year's session, Congress enacted Senator Edward Kennedy's *Star Schools Program Assistance Act*, which authorized funding for development of such networks nationally. Although MCET did not succeed in obtaining a $10 million first-year grant under the Star Schools program, the Massachusetts congressional delegation remains committed to obtaining funding for MCET's network. One strong lesson of the Star Schools process is that *the federal government is far more likely to fund a project to which the state has also made a financial commitment.* Major Star Schools grants were awarded to South Carolina and Oklahoma, both of which have state-established networks. The Commonwealth's commitment to this network, therefore, will strengthen MCET's ability to obtain significant federal funding.

MCET has also identified other potential sources of foundation and corporate support for telecommunications hardware and educational programming.

MCET will seek in-kind contributions from Massachusetts cable operators through the placement of satellite downlinks at cable systems and channel capacity for the distribution of programming. The cable industry has been extremely cooperative and helpful to MCET's Technical Assistance Program during the past three years. We have had initial discussions with leaders of the cable industry, who have expressed willingness to work with MCET. Based on these discussions we are projecting that 60 of the state's 95 cable systems will provide space for satellite receive equipment and channel capacity. These valuable contributions will enable the MCET network to reach a far greater number of schools and other institutions than it could if it were necessary to place satellite downlinks at each site.

Five-Year Budget Spreadsheet

	YEAR ONE	YEAR TWO	YEAR THREE	YEAR FOUR	YEAR FIVE	TOTAL
USES OF FUNDS						

OPERATING EXPENSES						
PERSONNEL						
Salaries & Wages	455,417	555,688	608,472	638,895	670,840	2,929,312
Fringe	81,975	100,024	109,525	115,001	120,751	527,276
CONTRACTUAL SERVICES						
Legal Services	75,000	78,750	82,688	86,822	91,163	414,422
Data network design	5,000	0	0	0	0	5,000
Maintenance	45,000	72,000	93,600	111,600	111,600	433,800
Accounting	15,000	18,000	21,600	25,920	31,104	111,624
Miscellaneous	5,000	5,500	6,050	6,655	7,321	30,526
GENERAL & ADMINISTRATIVE						
Travel	50,000	55,000	60,500	66,550	73,205	305,255
Insurance & Bonding	40,000	50,000	52,500	55,125	57,881	255,506
Office Supplies	20,000	25,000	26,875	28,891	31,057	131,823
Technical Supplies	5,000	10,000	10,000	10,000	10,000	45,000
Printing	50,000	57,500	66,125	76,044	87,450	337,119
Postage & Shipping	20,000	23,000	26,450	30,417	34,980	134,848
Equipment & Furniture	55,000	35,000	20,000	15,000	15,000	140,000
Telephone	50,000	60,000	72,000	86,400	103,680	372,080
Rent	85,000	40,000	40,000	40,000	40,000	245,000
Electricity	4,550	4,550	4,550	4,550	4,550	22,750
Local Area Network	9,000					9,000
Photocopier Lease	7,500	7,500	7,500	7,500	7,500	37,500
Auto Lease	3,500	4,000	4,000	4,000	4,000	19,500
Meetings & Conferences	20,000	21,000	22,050	23,153	24,310	110,513
Other Expenses	25,000	25,000	25,000	25,000	25,000	125,000
TELECOMMUNICATIONS LEASES						
Satellite Transponder	120,000	250,000	500,000	750,000	1,000,000	2,620,000
Microwave - Lowell/Boston	30,000	30,000	30,000	30,000	30,000	150,000
Audioconferencing WATS lines	66,469	137,945	511,190	746,491	979,289	2,441,384
Data Network Transmission		64,214	89,300	114,386	126,929	394,829
Uplinking - E. Mass.	48,000	128,000	250,000	375,000	500,000	1,301,000
Uplinking - W. Mass.	27,000	45,800	93,800	140,600	187,500	494,700
Mobile Satellite Uplink	20,000	40,000	50,000	60,000	70,000	240,000
PROGRAM ACQUISITION FUND	250,000	500,000	500,000	500,000	500,000	2,250,000
TOTAL OPERATING	1,688,411	2,443,471	3,383,775	4,173,999	4,945,111	16,634,767

	YEAR ONE	YEAR TWO	YEAR THREE	YEAR FOUR	YEAR FIVE	TOTAL
NETWORK DEVELOPMENT EXPENSES						
SATELLITE RECEIVE EQUIPMENT						
Institutional Sites	550,000	275,000	275,000	275,000		1,375,000
Local Distribution Networks	262,500	262,500	105,000			630,000
CLASSROOM EQUIPMENT	300,000	250,000	240,000	220,000	120,000	1,130,000
MICROWAVE LINKS -portable	30,000					30,000
WESTERN MASS. HUB						
Upgrade uplink	30,000					30,000
Switching Center		112,619				112,619
Prod'n/Editing Facility	299,525					299,525
Satellite Receive Equipment	30,000					30,000
Microwave Connection		150,000				150,000
DATACOMM TURNKEY SYSTEM		25,430	172	172	86	25,860
AUDIOCONFERENCING BRIDGE	60,860		860			61,720
Sub-Total	1,562,885	1,075,549	621,032	495,172	120,086	3,874,724
SPARE PARTS	62,515	105,537	130,379	150,186	154,989	603,606
TOTAL NETWORK DEVELOPMENT	1,625,400	1,181,086	751,411	645,358	275,075	4,478,330
TOTAL USES OF FUNDS	3,313,812	3,624,557	4,135,186	4,819,357	5,220,185	21,113,097
SOURCES OF FUNDS						
USER FEES						
MEMBERSHIP						
Access Fee	156,000	296,000	278,000	278,000	236,000	1,244,000
Subscription		109,680	163,520	219,520	260,800	753,520
PROGRAM ACQUISITION FUND		500,000	500,000	500,000	500,000	2,000,000
TRANSMISSION SERVICES						
Space Segment	40,000	250,000	500,000	750,000	1,000,000	2,540,000
Portable Microwave Lease	2,000	5,000	10,000	10,000	15,000	42,000
Mobile Uplink	20,000	40,000	50,000	60,000	70,000	240,000
Uplinking Services						
Eastern Mass.	48,000	128,000	250,000	375,000	500,000	1,301,000
Western Mass.	54,000	91,600	187,600	281,200	375,000	989,400
Audioconferencing Services	18,000	112,500	225,000	337,500	450,000	1,143,000
TOTAL USER FEES	338,000	1,532,780	2,164,120	2,811,220	3,406,800	10,252,920
STATE APPROPRIATION	3,144,812	2,689,167	2,286,736	2,331,687	2,111,175	12,563,577
TOTAL SOURCES OF FUNDS	3,482,812	4,221,947	4,450,856	5,142,907	5,517,975	22,816,497

Appendix 1

Chapter 560 as Amended

CHAPTER 560

OF THE ACTS OF 1982

(As amended by:
Chapter 110 of the Acts of 1987
Chapter 111 of the Acts of 1987, and
Chapter 305 of the Acts of 1988)

An Act Creating the MASSACHUSETTS CORPORATION FOR EDUCATIONAL TELECOMMUNICATIONS

Printed January 1989

Chap. 560. AN ACT CREATING THE MASSACHUSETTS CORPORATION FOR EDUCATIONAL TELECOMMUNICATIONS.

(With amendments as of Jan. 1989: Ch. 110 and Ch.111 of the acts of 1987 and Ch. 305 of the acts of 1988.)

Whereas, The deferred operation of this act would tend to defeat its purpose, which is to provide immediately for the establishment of a statewide, multipurpose, educational telecommunications network in the commonwealth, therefore it is hereby declared to be an emergency law, necessary for the immediate preservation of the public convenience.

Be it enacted, etc., as follows:

SECTION 1. Purpose. It is hereby found and declared that:-

The commonwealth is lagging behind other states in utilizing development in telecommunications technology in order to solve educational, health and human services, and manpower problems, to facilitate cooperation among public and private institutions, and to make education and information more accessible to the citizens of the commonwealth.

There is an urgent need to link private and public post-secondary educational institutions, school systems, libraries, and health institutions in the commonwealth to the many potential users of telecommunications by the establishment of a statewide, electronic, multisystem, multipurpose telecommunications network. Such a network would encourage and facilitate economies of scale and complementarity among such entities by providing a direct communication link for education, information, and data resource sharing; provide a means of delivering education and information to the home and community; contribute substantially to enlarging the pool of trained manpower essential to the economy of the commonwealth by connecting educational institutions to public and private worksites; and effect cost savings and improvements in the many non-instructional applications of telecommunications.

Therefore, it is found that it is in the public interest to promote the education, prosperity and general welfare of its citizens, a public purpose for which public money may be expended, by creating the Massachusetts Corporation for Educational Telecommunications to establish and operate a statewide telecommunications network to meet the educational and informational needs of business, industry, government, and the inhabitants of the commonwealth.

SECTION 2. The following terms as used in this act shall have the following meaning, except where the context clearly indicates otherwise:

"Board", the board of directors of the Massachusetts Corporation for Educational Telecommunications.

"Network", the statewide educational telecommunications network to be established by the Massachusetts Corporation for Educational Telecommunications pursuant to the provisions of this act.

"Corporation", the Massachusetts Corporation for Educational Telecommunications.

"Current expenses", as applied to the network or any portion thereof established pursuant to the provisions of this act, the amount of reasonable and necessary expenses for the administration and operation of the network after it has become operational.

"Project cost", as applied to the network or any portion thereof created pursuant to the provisions of this act, embraces all or any part of the cost of construction, acquisition, alteration, enlargement, reconstruction, and remodeling of the network, including all lands, structures, real or personal property, rights, rights of way, air rights, franchises, easements and interests acquired or used in connection with the network, the cost of demolishing or removing any buildings or structures on land so acquired, including the cost of acquiring any lands to which such buildings or structures may be moved, financing charges, interest prior to, during, and for a period after completion of such construction and acquisition, amounts reasonably required to make the network operational, the cost of architectural, engineering, financial and legal services, plans, specifications, studies, surveys, estimates of costs and revenues, administrative expenses, expenses necessary or incident to determining the feasibility or practicability of constructing the network and such other expenses as may be necessary or incident to the construction and acquisition of the network.

"Start-up expenses", as applied to the network or any portion thereof created pursuant to the provisions of this act embraces all or part of the expenses for the administration and operation of the network incurred in the establishment of the network prior to the time the network becomes operational.

* SECTION 3. There is hereby created a body, politic and corporate, to be known as the Massachusetts Corporation for Educational Telecommunications, hereinafter referred to as MCET. MCET is hereby constituted a public instrumentality of the commonwealth and the exercise by MCET of the powers conferred in this act shall be deemed and held to be the performance of an

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mendments to Section 3 (per Ch. 305 of the acts of 1987 and Ch. 111 of the acts of 1987) appear n pages 4A and 5.

essential public function. MCET is hereby placed in the University of Massachusetts but shall not be subject to the supervision or control of said university or of any board, bureau, department, office, or any agency or officer of the commonwealth except as specifically provided in this act.

MCET shall be governed and its powers exercised by a board of directors which shall consist of eighteen directors and shall be representative of the racial, ethnic and cultural diversity of the commonwealth, the secretary of economic development and manpower affairs, the commissioner of the department of education, the chancellor of the board of regents of higher education, the president of the University of Massachusetts, the president of WGBH Educational Foundation, the chairman of the advisory council to MCET and twelve persons appointed by the governor, three of whom shall be presidents of private institutions of higher education in the commonwealth, one of whom shall be the president of a Massachusetts state college, one of whom shall be the president of a Massachusetts community college, two of whom shall be representatives of the Massachusetts Municipal Association, one of whom shall be the superintendent of a kindergarten through twelfth grade local public school district in the commonwealth and four of whom shall be bona fide representatives of other major sectors significantly affected by MCET. Each member appointed by the governor shall serve for a term of seven years and thereafter until his or her successor is appointed, except that in making the initial appointments the governor shall appoint one member to serve for two years, two to serve for three years, two to serve for four years, two to serve for five years, two to serve for six years and two to serve for seven years. Any person appointed to fill a vacancy in the office of a member of the board shall be appointed in a like manner and shall serve for the remainder of the unexpired term. Any appointed member shall be eligible for reappointment, and may be removed from his or her appointment by the governor for cause. Nine directors shall constitute a quorum and the affirmative vote of a majority of the directors present and eligible to vote shall be necessary for any action to be taken by the board. The directors shall serve without compensation, but shall be entitled to reimbursement for actual and necessary expenses incurred in the performance of their duties. The board shall meet no less than four times in each year, and shall have final authority over the activities of MCET.

The board shall annually elect from among its members a chairman and vice-chairman. The board shall also designate a secretary and treasurer who need not be members of the board. The secretary shall keep a record of the proceedings of the corporation and shall be custodian of all books, documents, and papers filed with the corporation, and its official seal. The secretary shall cause copies to be made of all minutes and other records and documents of the corporation and shall certify that such copies are true copies and all persons dealing with the corporation may rely upon such certification. The treasurer shall be chief financial and accounting officer of the corporation and shall be in charge of its funds, books of account and accounting records.

The board shall hire an executive director and establish his salary. The executive director shall be the chief administrative and operational officer of the corporation and shall direct and supervise its administrative affairs and general management. The executive director shall attend meetings of the board and may, subject to the general supervision of the board, employ other employees, consultants, and agents, including counsel and advisors.

Neither the corporation nor any of its officers, directors, agents, employees, consultants or advisors shall be subject to the provisions of sections nine A, forty-five, forty-six and fifty-two of chapter thirty, chapter thirty-one, or section twenty-seven and sections twenty-seven A to twenty-seven F, inclusive, of chapter one hundred and forty-nine of the General Laws; provided, that in purchasing products or services, the corporation shall at all times follow generally accepted good business practices.

Amended language (per Ch.305 of the acts of 1988) appears on p.4A

~~The provisions of chapter two hundred and sixty-eight A of the General Laws shall apply to all directors, officers, and employees of the corporation except that the corporation may purchase from, sell to, borrow from, contract with or otherwise deal with any organization in which any director of the corporation is in any way interested or involved; provided, however, that such interest or involvement is disclosed in advance to the directors and recorded in the minutes of the proceedings of the corporation; and provided, further, that no director having such an interest or involvement may participate in any decision relating to such organization.~~

All officers and employees of the corporation having access to its cash or negotiable securities shall give bond to the corporation at its expense, in such amount and with such surety as the board may prescribe. The persons required to give bond may be included in one or more blanket or scheduled bonds. The board may purchase liability insurance for directors, officers and employees, and may indemnify said persons against the claims of others.

There shall be an advisory council to MCET, which shall

Chapter 305

THE COMMONWEALTH OF MASSACHUSETTS

In the Year One Thousand Nine Hundred and Eighty-eight

AN ACT FURTHER REGULATING THE CONDUCT OF CERTAIN PUBLIC OFFICIALS.

Be it enacted by the Senate and House of Representatives in General Court assembled and by the authority of the same, as follows:

Section 3 of Chapter 560 of the acts of 1982 is hereby amended by striking out the sixth paragraph and inserting in place thereof the following paragraph:—

The provisions of chapter two hundred and sixty-eight A of the General Laws shall apply to all directors, officers, advisory council members and employees of the corporation except as provided in this paragraph. Notwithstanding the provisions of sections seven and twenty-three of said chapter two hundred and sixty-eight A, the corporation may purchase from, sell to, borrow from, contract with or otherwise deal with any organization in which any director of the corporation or advisory council member is in any way interested or involved; provided, however, that such interest or involvement is disclosed in advance to the directors and recorded in the minutes of the proceedings of the corporation; and provided, further, that no director or advisory council member may not participate in a decision to purchase from, sell to, borrow from, contract with, or otherwise deal with any organization with which such director or advisory council member is in any way interested or involved. Notwithstanding the provisions of sections six and twenty-three of said chapter two hundred and sixty-eight A, a director or advisory council member who is required by this act to be affiliated with a particular class of business organization, institution or association, may participate in a particular matter affecting the financial interests of the organization, institution or association with which he is affiliated; provided, however, that (a) said particular matter is confined to the establishment, as opposed to the operation and maintenance, of the statewide telecommunications network; (b) said particular matter does not affect the financial interests of said director or advisory council member, or an immediate family member or partner of said director or advisory council member; (c) the financial interest of said director's or advisory council member's organization, institution or association is substantially the same as the interest of other members of the particular class of organizations, institutions or associations with which that director or advisory council member is required by this act to be affiliated; (d) said particular matter is not a decision to purchase from, sell to, borrow from, contract with, or otherwise deal with said organization, institution, or association, in which case the provisions of the second sentence of this paragraph shall apply; and (e) the interest of any said director's or advisory council member's organization, institution or association is disclosed in advance to the directors and recorded in the minutes of the proceedings of the corporation, and a copy of the disclosure forwarded to the state ethics commission. For the purposes of this paragraph, the WGBH Educational Foundation shall be deemed to belong to a class comprised of entities engaged in public educational telecommunications.

November 1988

Amended, see note below

* ~~consist of no more than twenty-six members appointed by the governor for terms of seven years who shall be broadly representative of potential providers and users of said network and who are not otherwise represented on the board of directors of MCET. The council shall meet no less than three times a year and shall annually elect a chairman from among its membership~~.

SECTION 4. MCET shall have the following powers:-

(a) to make, amend, and repeal by-laws, rules and regulations, and policies for the management of its affairs and the operation of the network, including the regulation of network use and program content; provided that said rules, regulations and policies shall demonstrate, both in text and in application, a firm commitment to the promotion of equal access to MCET services by racial and ethnic communities;

(b) to adopt an official seal;

(c) to sue and be sued, in its own name;

(d) to develop, operate, and maintain a statewide, electronic, multisystem, multipurpose telecommunications network providing educational and information services and utilizing available and successor telecommunications technologies, which may include, but need not be limited to, leased lines, satellite systems, instructional television fixed service or multipoint distribution service systems, land lines, and a point-to-point microwave system, or any combination thereof;

(e) to encourage the use of said network by providing post-secondary institutions and other entities assistance in the development and production of educational and informational programming which meets the educational, cultural and economic needs of the entire population of the commonwealth; provided, however, that MCET shall not be authorized to produce such programs;

(f) to acquire, own, hold, lease, rent, dispose of and encumber real and personal property of any nature or any interest therein in the exercise of its powers and performance of its duties under this act;

(g) to enter into agreements or transactions with any federal, state or municipal agency or other public institution or with any private individual, partnership, firm, corporation, association or other entity;

(h) to appoint officers, employers, consultants, agents and advisors and fix their compensation;

(i) to appear in its own behalf before boards, commissions, courts, departments, or other agencies of federal, state or municipal government;

(j) to procure insurance against any losses in connection with its property in such amounts, and from such insurers, as may be necessary or desirable;

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* *CHAPTER 111 of the ACTS OF 1987 - "Section 3 of Chapter 560 of the Acts of 1982 is hereby amended by striking out the eighth paragraph and inserting in place thereof the following paragraph:* - There shall be an advisory council to MCET, which shall consist of no more than fifteen members appointed by the governor for terms of five years who shall be broadly representative of the racial, ethnic, and cultural diversity of the commonwealth and of potential providers and users of said network and who are not otherwise represented on the board of directors of MCET, including, but not limited to, representatives of the following sectors: teacher labor organizations; the board of library commissioners; hospitals in the commonwealth; higher education programs in medicine, education and engineering, and the nursing and legal professions. The council shall evaluate the telecommunications needs of various sectors of the commonwealth and recommend to the MCET board of directors programs and activities designed to serve any such needs. The council shall meet no less than three times a year and shall annually elect a chairman from among its membership. Eight members of the advisory

(k) to apply for, accept, hold, use, and dispose of any and all donations, grants, bequests, and devises, conditional or otherwise, of money, property, services, or other things of value which may be received from the United States or any agency thereof, any governmental agency, any institution, person, firm or corporation, public and private, such donations, grants, bequests and devises to be applied for, accepted, held, used or disposed of for any and all of the purposes specified in this act and in accordance with any terms and conditions thereof. Receipt of each such donation or grant shall be detailed in the annual report of the corporation, which shall include the identity of the donor or lender, the nature of the transaction and any conditions attaching thereto;

(l) to fix and revise from time to time, charge, and collect rates, rents, fees and charges for the use of or access to the telecommunications network described herein or any portion thereof;

(m) to invest any funds held in reserves or sinking funds, or any funds not required for immediate disbursement, in such investments as may be lawful for fiduciaries in the commonwealth;

(n) to borrow money;

(o) to exercise any other powers of a corporation organized under chapter one hundred and fifty-six B of the General Laws; and

(p) to do any and all things necessary or convenient to carry out the purposes of this act.

SECTION 5. (a) There is hereby established a fund for carrying out the purposes of this act, hereinafter referred to as the Telecommunications Fund, to which shall be credited any appropriations authorized by the general court specifically designated to be credited to MCET.

(b) The corporation shall hold the telecommunications fund in an account or accounts separate from other funds. All appropriations, grants and other funds received by the corporation and not specifically designated to be credited to the telecommunications fund, including all fees and charges collected by the corporation, and the proceeds of all investments, may be used to pay for the proper general expenses of the corporation.

(c) Unless otherwise specified, all moneys of the corporation from whatever source derived shall be paid to the treasurer of the corporation. Said moneys shall be deposited in the first instance by the treasurer in one or more national banks, trust companies or banking companies in compliance with section thirty-four of chapter twenty-nine of the General Laws. Funds in such accounts shall be paid out on the warrant or other order of the treasurer of the corporation or of such other person or persons as the board may authorize to execute such warrant or warrants.

(d) The corporation shall draw upon the principal and income of the telecommunications fund to meet the start-up expenses and project costs of establishing and operating the statewide telecommunications network described in this act, provided that the corporation shall not utilize the principal of the Telecommuncations Fund to support current expenses of the network.

SECTION 6. The corporation annually shall submit a complete and detailed report of its activities within ninety days after the end of its fiscal year to the clerk of the house of representatives and to the clerk of the senate.

SECTION 7. The books and records of the corporation shall be subject to an annual audit by the auditor of the commonwealth.

SECTION 8. The corporation shall establish a network, and take any and all actions necessary or appropriate thereto, including disbursing available funds from the Telecommunications Fund to meet the project costs and start-up expenses of such a network, only after:

(a) formulation of a detailed plan for the creation and operation of such a network; provided, that the plan shall be supported by independently verifiable information; and provided, further, that the plan shall include but not be limited to:

(1) a detailed description of the proposed network, including an analysis of lands, structures, facilities, machinery and equipment reasonably necessary for the successful operation thereof; an analysis of the feasibility of using surplus state real property for such a network; and a statement of the proposed project costs reasonably associated with the establishment of such a network, with a detailed breakdown of such project costs, including the estimate of the cost to the commonwealth of the debt service on any bonds or notes issued or to be issued in support of such a network;

(2) a statement of the proposed annual start-up expenses, project costs and current expenses of the network for the first five years of its existence, including a detailed breakdown of such costs and expenses, with a reasonable projection of said

costs and expenses which the corporation expects to meet through assistance provided by rates, rents, fees, and charges imposed upon users and support from any other source; and

(3) a description of the public benefits to be engendered by the network, including particularly an analysis of increased and enhanced employment and educational opportunities;

(4) a description of the proposed activities of the network, including the proposed utilization thereof by participating businesses and institutions;

(5) a proposal for capital outlay appropriation from the commonwealth in support of the establishment of the network and such annual maintenance appropriations as may reasonably be required for the successful operation of the network; and

(b) the board has approved the establishment of the network described in the plan, having found and incorporated in its minutes that:

(1) the network as proposed in the plan will substantially further the basic purpose of this act to provide for the establishment and operation of a statewide educational telecommunications network that would facilitate the delivery of education and information among such institutions of learning as public and private higher education, the schools, libraries, cultural and health institutions, and public and corporate learning centers, and between these institutions of learning and the public;

(2) there is no reasonable expectation that the network proposed will duplicate the actual or proposed facilities or programs of institutions or consortia of institutions located within the commonwealth, or, to the extent that a possibility for such duplication may be found to exist, the network as proposed in the plan may reasonably be characterized as enhancing or supplementing the ability of such an institution or consortium of institutions to conduct such actual or proposed facilities or programs;

(3) the establishment or operation of the network as proposed in the plan are beyond the financial means of any single institution or consortium of institutions located in the commonwealth, either because the capital costs or operating costs associated therewith are prohibitive or because the capital costs or operating costs associated with maintaining such a network at a level consistent with developing technology are prohibitive; and

(c) submission by the board of the plan and findings formulated pursuant to this section to the governor, the president of the senate and the speaker of the house of representatives, the chairman of the senate committee on ways and means and the chairman of the house committee on ways and means.

*Amended by Ch. 110 of the Acts of 1987**

* SECTION 9. No monies shall be credited to the Telecommunications Fund in support of the network unless and until the plan and findings required pursuant to section ~~seven~~*of this act have been received and approved in writing by the house and senate committees on ways and means.

Approved December 23, 1982.

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* ***CHAPTER 110 of the ACTS of 1987** - "Section 9 of Chapter 560 of the acts of 1982 is hereby amended by striking out, in line 3, the word "seven" and inserting in place thereof the word: - eight."*

June 3, 1987

Chapter 110.

THE COMMONWEALTH OF MASSACHUSETTS

In the Year One Thousand Nine Hundred and Eighty-seven

AN ACT MAKING A CORRECTIVE CHANGE TO THE MASSACHUSETTS CORPORATION FOR EDUCATIONAL TELECOMMUNICATIONS LAW.

Be it enacted by the Senate and House of Representatives in General Court assembled, and by the authority of the same, as follows:

Section 9 of chapter 560 of the acts of 1982 is hereby amended by striking out, in line 3, the word "seven" and inserting in place thereof the word:- eight.

House of Representatives, May 28, 1987.

Passed to be enacted, George Keverian, Speaker.

In Senate, May 28, 1987.

Passed to be enacted, William M. Bulger, President.

June 3, 1987.

Approved,

Michael Dukakis, Governor.

S 222

Chapter 111

THE COMMONWEALTH OF MASSACHUSETTS

In the Year One Thousand Nine Hundred and Eighty-seven

AN ACT RELATIVE TO MEMBERSHIP ON THE ADVISORY COUNCIL OF THE MASSACHUSETTS CORPORATION FOR EDUCATIONAL TELECOMMUNICATIONS.

Be it enacted by the Senate and House of Representatives in General Court assembled, and by the authority of the same, as follows:

Section 3 of chapter 560 of the acts of 1982 is hereby amended by striking out the eighth paragraph and inserting in place thereof the following paragraph:-

There shall be an advisory council to MCET, which shall consist of no more than fifteen members appointed by the governor for terms of five years who shall be broadly representative of the racial, ethnic, and cultural diversity of the commonwealth and of potential providers and users of said network and who are not otherwise represented on the board of directors of MCET, including, but not limited to, representatives of the following sectors: teacher labor organizations; the board of library commissioners; hospitals in the commonwealth; higher education programs in medicine, education and engineering, and the nursing and legal professions. The council shall evaluate the telecommunications needs of various sectors of the commonwealth and recommend to the MCET board of directors programs and activities designed to serve any such needs. The council shall meet no less then three times a year and shall annually elect a chairmen from among its membership. Eight members of the advisory council shall constitute a quorum.

House of Representatives, May 26, 1987.

Passed to be enacted, George Keverian, Speaker.

In Senate, May 26, 1987.

Passed to be enacted, William M. Bulger, President.

June 3, 1987.

Approved,

Governor.

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Chapter 305

THE COMMONWEALTH OF MASSACHUSETTS

In the Year One Thousand Nine Hundred and Eighty-eight

AN ACT FURTHER REGULATING THE CONDUCT OF CERTAIN PUBLIC OFFICIALS.

Be it enacted by the Senate and House of Representatives in General Court assembled, and by the authority of the same, as follows:

Section 3 of chapter 560 of the acts of 1982 is hereby amended by striking out the sixth paragraph and inserting in place thereof the following paragraph:-

The provisions of chapter two hundred and sixty-eight A of the General Laws shall apply to all directors, officers, advisory council members and employees of the corporation except as provided in this paragraph. Notwithstanding the provisions of sections seven and twenty-three of said chapter two hundred and sixty-eight A, the corporation may purchase from, sell to, borrow from, contract with or otherwise deal with any organization in which any director of the corporation or advisory council member is in any way interested or involved; provided, however, that such interest or involvement is disclosed in advance to the directors and recorded in the minutes of the proceedings of the corporation; and provided, further, that no director or advisory council member may participate in a decision to purchase from, sell to, borrow from, contract with, or otherwise deal with any organization with which such director or advisory council member is in any way interested or involved. Notwithstanding the provisions of sections six and twenty-three of said chapter two hundred and sixty-eight A, a director or advisory council member who is required by this act to be affiliated with a particular class of business organization, institution or association, may participate in a particular matter affecting the financial interests of the organization, institution or association with which he is affiliated; provided, however, that (*a*) said particular matter is confined to the establishment, as opposed to the operation and maintenance, of the statewide telecommunications network; (*b*) said particular matter does not affect the financial interests of said director or advisory council member, or an immediate family member or partner of said director or advisory council member; (*c*) the financial interest of said director's or advisory council member's organization, institution or association is substantially the same as the interest of other members of the particular class of organizations, institutions or associations with which that director or advisory council member is required by this act to be affiliated; (*d*) said particular matter is not a decision to purchase from, sell to, borrow from, contract with, or otherwise deal with said organization, institution, or association, in which case the provisions of the second sentence of this paragraph shall apply; and (*e*) the interest of any said director's or advisory council member's organization, institution or association is disclosed in advance to the directors and recorded in the minutes of the proceedings of the corporation, and a copy of the disclosure forwarded to the state ethics commission. For the purposes of this paragraph, the WGBH Educational Foundation shall be deemed to belong to a class comprised of entities engaged in public educational telecommunications.

House of Representatives, November 22, 1988.

Passed to be enacted, , Speaker.

In Senate, November 22, 1988.

Passed to be enacted, Walter J Boverini, President.

November 30, 1988.

Approved,

Michael Dukakis Governor.

Appendix 2

Survey of High School Principals

SURVEY OF HIGH SCHOOL PRINCIPALS

Section 905(b)(3) of the Star Schools legislation requires that applicants engage in survey and analysis to ensure that the services offered "will increase the availability of courses of instruction in mathematics, science, and foreign languages, as well as the other subjects to be offered."

As a first step in obtaining this information for Massachusetts, MCET worked with the state Department of Education to develop a survey of public high school principals to determine:

- Which courses in mathematics, science, and foreign languages are being taught this year at Massachusetts high schools;
- Which courses schools would like to offer but did not teach this year due to insufficient enrollment, unavailability of teachers, or budgetary constraints;
- What types of teacher and administrator training are currently offered, and what types schools would like to offer;
- What telecommunications capabilities are available at schools, e.g. cable reception, television production, and television wiring.

The survey was reviewed by a number of superintendents, principals, and educators; experts within the Department of Education; and the Grants Committee of the MCET Board. The survey was mailed on February 23, 1988, to the 303 public high school principals, with copies to the superintendents. A cover letter was attached from Harold Raynolds Jr., the Massachusetts Commissioner of Education.

The majority of principals responded immediately to the survey. After follow-up calls to the non-responders, surveys were returned from 242 high schools, for a response rate of 80 percent. The complete tabulation of results is attached.

Except for the vocational schools, virtually all high schools in Massachusetts offer "core" subjects, such as Geometry and Algebra; Biology, Chemistry, and Physics; and four levels of Spanish and French. The courses that were most in demand fell into three categories:

- Specialized science and mathematics areas--including astronomy, probability/statistics, marine science, electricity, geography, and Pascal 1 and 2;
- Languages other than those commonly available--particularly Russian and German; and
- Advanced Placement courses in all subject areas, and other advanced courses, such as second-year physics.

The course most in demand was Russian. Currently, students in only 17 high schools (7 percent) have the option of learning Russian.

Overall, the demand for teacher and administrator training was high. Even in cases where principals indicated a type of training was available, they would often also check the box indicated need for additional training in that area. Demand was greatest for teaching skills (such as instructional strategies and classroom management) and administrative skills (such as program evaluation). Demand was also high for training in educational technologies, particularly software applications, and for curriculum development in remedial math and reading.

In the technology section, 92 percent of high schools indicated some TV equipment (cameras and VCRs), 79 percent are connected to cable television, and 48 percent have their classrooms wired for television. Eighty percent of schools use conventional broadcast television in classrooms, while only 10 percent currently use live, interactive television.

MASSACHUSETTS NEEDS ASSESSMENT SURVEY RESULTS

	Offer Course		Want Course	
	No.	Pct.	No.	Pct.
Total High Schools	303			
Responses	242	80%		
MATHEMATICS				
Career/Vocational Math	161	67%	20	8%
Geometry	237	98%	3	1%
Algebra 2nd year	234	97%	3	1%
Precalculus/Analysis	185	76%	9	4%
Calculus	177	73%	10	4%
Calculus AB - AP	103	43%	28	12%
Calculus BC - AP	43	18%	22	9%
Probability/Statistics	74	31%	47	19%
Trigonometry	194	80%	6	2%
Computer Literacy	181	75%	12	5%
Computer Science	117	48%	17	7%
Computer Programming	186	77%	11	5%
Computer Science A - AP	35	14%	35	14%
Computer Science B - AP	20	8%	23	10%
BASIC	170	70%	11	5%
Pascal	156	64%	32	13%
Pascal 2nd year	35	14%	39	16%
Other Mathematics	59	24%	8	3%
SCIENCE				
Biology	235	97%	4	2%
Biology 2nd year/ Anatomy & Physiology	174	72%	11	5%
Biology - AP	94	39%	38	16%
Marine Science/Biology	50	21%	43	18%
Zoology	14	6%	30	12%
Botany	18	7%	36	15%
Chemistry	229	95%	6	2%
Chemistry 2nd year	2	1%	2	1%
Chemistry - AP	75	31%	34	14%

	Offer Course		Want Course	
	No.	Pct.	No.	Pct.
Physics	230	95%	2	1%
Project Physics	48	20%	23	10%
Physics 2nd year	45	19%	25	10%
Physics B - AP	48	20%	33	14%
Physics C - AP	17	7%	18	7%
Physical Science	172	71%	7	3%
Physical Science 2nd year	23	10%	12	5%
Electricity/Electronics	103	43%	42	17%
Earth Science/Geology	176	73%	14	6%
Geography	79	33%	41	17%
Astronomy	38	16%	47	19%
Oceanography	45	19%	39	16%
Other Science	64	26%	3	1%
FOREIGN LANGUAGES				
English as a Second Language (ESL)	75	31%	10	4%
French 1	207	86%	7	3%
French 2	206	85%	8	3%
French 3	205	85%	6	2%
French 4	197	81%	4	2%
French 5	105	43%	12	5%
French Language - AP	47	19%	31	13%
French Literature - AP	12	5%	25	10%
Spanish 1	211	87%	6	2%
Spanish 2	211	87%	6	2%
Spanish 3	205	85%	6	2%
Spanish 4	192	79%	6	2%
Spanish 5	98	40%	19	8%
Spanish Language - AP	38	16%	28	12%
Spanish Literature - AP	10	4%	22	9%
Latin 1	164	68%	22	9%
Latin 2	151	62%	26	11%
Latin 3	98	40%	25	10%
Latin 4	67	28%	19	8%
Latin 5	8	3%	12	5%
Latin (Vergil) - AP	12	5%	17	7%
Latin (Catullus-Horace) - AP	2	1%	11	5%

	Offer Course		Want Course	
	No.	Pct.	No.	Pct.
Chinese 1	8	3%	25	10%
Chinese 2	2	1%	2	1%
Chinese 3	2	1%	9	4%
Chinese 4	2	1%	8	3%
Chinese 5	1	0%	6	2%
Greek 1	7	3%	17	7%
Greek 2	6	2%	13	5%
Greek 3	4	2%	5	2%
Greek 4	2	1%	4	2%
Greek 5	0	0%	4	2%
Italian 1	42	17%	18	7%
Italian 2	40	17%	14	6%
Italian 3	31	13%	10	4%
Italian 4	19	8%	8	3%
Italian 5	5	2%	3	1%
German 1	56	23%	31	13%
German 2	55	23%	29	12%
German 3	38	16%	23	10%
German 4	27	11%	16	7%
German 5	7	3%	9	4%
German Language - AP	5	2%	9	4%
Japanese 1	2	1%	22	9%
Japanese 2	1	0%	16	7%
Japanese 3	1	0%	8	3%
Japanese 4	0	0%	6	2%
Japanese 5	0	0%	4	2%
Portuguese 1	14	6%	9	4%
Portuguese 2	14	6%	6	2%
Portuguese 3	11	5%	4	2%
Portuguese 4	11	5%	4	2%
Portuguese 5	4	2%	2	1%
Russian 1	17	7%	50	21%
Russian 2	11	5%	39	16%
Russian 3	5	2%	12	5%
Russian 4	2	1%	10	4%
Russian 5	0	0%	4	2%
Other Languages	11	5%	2	1%
Other Subject Areas			40	17%

	Offer Course		Want Course	
	No.	Pct.	No.	Pct.
Students travel to take courses	60	25%		
TEACHING SKILLS				
Curriculum Development	109	45%	69	29%
Curriculum Implementation	63	26%	59	24%
Instructional Strategies	78	32%	95	39%
Classroom Management	54	22%	78	32%
Study Skills	24	10%	0	0%
Counseling/Guidance	49	20%	50	21%
ADMINISTRATIVE SKILLS				
Personnel Evaluation	74	31%	75	31%
Program Evaluation	36	15%	81	33%
Instructional Supervision	57	24%	66	27%
Organizational Development	29	12%	59	24%
ADVANCED COURSES IN SUBJECT AREAS				
Mathematics	21	9%	32	13%
Science	22	9%	28	12%
Foreign Languages	18	7%	22	9%
CURRICULUM DEVELOPMENT				
Mathematics	21	9%	32	13%
Remedial Mathematics	38	16%	58	24%
Science	22	9%	28	12%
Foreign Languages	18	7%	22	9%
Remedial Reading	43	18%	55	23%
Language Skills	47	19%	44	18%
Bilingual Education	18	7%	31	13%
Special Needs	55	23%	43	18%
EDUCATIONAL TECHNOLOGY				
Hardware Applications	64	26%	52	21%
Software Applications	84	35%	69	29%
Other Teacher and Administrator Training	20	8%	5	2%

	Offer Course		Want Course	
	No.	Pct.	No.	Pct.
TECHNOLOGY AVAILABLE AT SCHOOLS				
Can receive cable TV	191	79%		
Can send programming over cable	100	41%		
Classrooms wired	117	48%		
TV studio at school	24	10%		
Access to TV studio	78	32%		
Cameras, VCRs at school	222	92%		
Satellite reception	16	7%		
Microcomputers/modems	72	30%		
Local Area Network	22	9%		
Computer network to other locations	15	6%		
Other	16	7%		
USED FOR COURSES				
Conventional TV/videotape	194	80%		
Live, interactive TV	25	10%		
one-way video	9	4%		
two-way video	7	3%		
Microcomputers/modems	72	30%		
Computer network	15	6%		
Other	7	3%		
Additional Comments	20	8%		

Appendix 3

State Funding of Distance Learning Networks

STATE FUNDING OF DISTANCE LEARNING NETWORKS

State	System	Start-up	Operating
Alaska	Learn Alaska Network	11,000,000	6,000,000
Arkansas	Impact Learning Systems	0	4,000,000
California	Calif. State Univ. Chico Instruc. Media Ctr.	4,500,000	50,000
	Calif. State Univ. Stanislaus Regional Learning Net.	350,000	155,000
Colorado	University of Colorado Television	130,000	12,000
Connecticut	Conn. Community Colleges Instructional TV Network	370,000	*
	Univ. of Connecticut Center for Instructional Media	8,500,000	1,500,000
Florida	Florida Engineering Educational Delivery System	*	*
Illinois	Caroll Instructional Television Consoritum	35,000	*
	Governor's State University	*	*
Indiana	Indiana Higher Education Telecom. System	*	3,500,000
	Indiana University School of Medicine TV Network	0	1,000,000
Iowa	Kirkwood Telecommuncations System	2,000,000	500,000
Kansas	Regents Continuing Education Network	*	170,000
Kentucky	Kentucky Educational Television	11,500,000	8,000,000
Maine	University of Maine Telecommunications System	6,000,000	*
Maryland	University of Maryland ITFS System	1,800,000	*
Minnesota	(Total state funding for systems below and others)	1,245,000	*
	East Central Minnesota Education Cooperative		
	Mid-State Telecommunications Cooperative		
	Woodland Cooperative Center		
Missouri	Educational Satellite Network	*	*
Nebraska	Univ. of Nebraska Medical Center Telecom. System	*	*

State	System	Start-up	Operating
Nevada	Univ. of Nevada Interactive Telecom. for Education	*	24,000
New Mexico	New Mexico Tech Net	*	*
	University of New Mexico ITFS System	*	*
New York	New York Network	14,000,000	3,000,000
North Carolina	Agency for Public Telecommunications	600,000	300,000
	Microelectronics Center of North Carolina	6,000,000	200,000
Ohio	Ohio Educational Broadcasting Network	3,000,000	3,600,000
	Higher Education Microwave System	*	*
Oklahoma	Oklahoma Higher Ed. Televised Instructional Sys.	14,000,000	900,000
	Oklahoma State University (satellite network)	1,000,000	*
Pennsylvania	PENNARAMA	*	40,000
South Carolina	South Carolina Educational Television	37,000,000	3,300,000
Texas	University of Texas Health Science Center Houston	*	*
Utah	Statewide Educational Telecommunications System	8,800,000	2,600,000
Vermont	Vermont Interactive Television	2,200,000	*
Virginia	Centex	*	300,000
	Governor's Ctr. for Educ'l Innovation and Technology	3,500,000	*
Washington	University of Washington Cablearn	*	5,000
	Washington Higher Education Telecom. System	1,500,000	*
West Virginia	College of Graduate Studies	*	25,000
Wisconsin	Univ. of Wisconsin Statewide Extension Educ'l Nets	*	850,000

* *Specific funding information not available at time of printing.*

Appendix 4

MCET Technical Assistance Program

MCET Technical Assistance Program

The Technical Assistance Program was instituted in 1986 to encourage Massachusetts institutions to develop applications of distance learning technologies. Projects implemented through the program utilize a combination of existing telecommunications capacities and temporary leased capacities.

Services provided by the Technical Assistance Program have evolved from needs articulated by educators in Massachusetts. These services are unique and include: planning and management of interactive transmissions; contracting for services and facilities such as production, transmission, remote site, and evaluation; and training site coordinators and on-camera personnel. By establishing cooperative relationships with cable television operators throughout Massachusetts, MCET has also developed the capacity to cost-effectively deliver distance learning services directly to classrooms and worksites.

During the past three years, the Technical Assistance Program has expanded. In 1986, MCET set out to: determine the extent and utility of existing capacity, i.e. satellite, microwave, cable television, and production facilities; encourage experimentation with diverse technologies among Massachusetts educators; and formally evaluate each demonstration project to document the effectiveness of distance learning.

By 1988, MCET recognized that educators also need a forum to discuss the applications and implications of distance learning technologies. Two conferences were organized by the Technical Assistance Program: "September Symposium," a statewide, one-day conference held in Boston; and "Distance Learning in the Northeast: Access and Equity in the Information Age," a two-day conference attended by 400 educators from New England and New York, held in Springfield, Massachusetts.

This year, through the Technical Assistance Program, MCET is also consulting with providers of existing capacity -- such as cable television operators and program services, New England Telephone Company, and on-line information services -- to establish more permanent "networks" among educators and students.

The following pages summarize distance learning demonstration projects that have been implemented through the Technical Assistance Program.

MCET Technical Assistance Program

Project Summary Sheet

Sponsor: Bureau of Educational Technologies
Massachusetts Department of Education

Title: "Solutions Unlimited"

Date: May 21, 1986

Description: A two-hour teleconference among middle school teachers, focussing on the use and integration of "Solutions Unlimited," a middle school curriculum using videotapes and computers to teach problem solving skills.

Technology: 23 Ghz. microwave, SportsChannel microwave and satellite network, cable television, audioconference

Sites: (origination) Bunker Hill Community College

Dracut High School
Greenfield Community College
Gavin Middle School, Boston
School Department TV Center, Chicopee

Other Info: The project also involved testing the use of the vertical blanking interval (vbi) of the television signal as a means of distributing instructional software. After an initial test, April 30, 1986, it was determined that there would not be sufficient use of such a system to warrant the necessary investment in customized software and equipment.

MCET Technical Assistance Program

Project Summary Sheet

Sponsor: Massachusetts Board of Library Commissioners

Title: "Using Television to Teach Adults How to Read"

Date: June 9, 1986

Description: A two-hour teleconference among researchers, adult literacy program directors and students, and librarians, to discuss the use of television for adult literacy training. The BLC used the teleconference to help plan a videotape instructional series for adults with 0 to 4th grade level reading skills.

Technology: Upstream cable television, 23 Ghz. microwave, SportsChannel microwave and satellite networks, (downstream) cable television

Sites: (origination) Boston Community Access and Programming Foundation Roxbury studio

Greater Media studio, Holden
South Hadley Public Library
Somerville Center for Adult Learning Experiences
Jackson / Mann Community School, Boston

MCET Technical Assistance Program

Project Summary Sheet

Sponsor: Talking Information Center (Radio Reading Service)

Title: Radio Reading Anniversary Celebration

Date: June 25, 1986

Description: A five-hour radio broadcast, live from the State House, to celebrate eight years of service of the Radio Reading Service. Radio Reading Service provides thousands of blind and print handicapped people with local, regional, and national news every day. The broadcast, featuring Governor Dukakis, also included political leaders, celebrities, volunteers and listeners.

Technology: Audioconference from the State House to radio reading broadcast stations in Marshfield and Springfield. The service is carried on FM sideband of 7 radio and 60 cable television outlets.

MCET Technical Assistance Program

Project Summary Sheet

Sponsor: Institute for Governmental Service, University of Massachusetts

Title: Public Policy Forum:
"The Right to Know Law"
"The Changing Nature of Federal Funding: The Impact on State and Local Government"

Dates: November 13, 1986
December 16, 1986

Description: Two, two-hour, interactive (two-way) video conferences to provide senior public managers and elected officials with a greater understanding of important and controversial topics in the public sector. The use of telecommunications was intended to provide wider participation in discussion of public policy at a greater depth than would otherwise be possible. An additional goal of the project was to provide IGS staff with a stronger background for planning future projects.

Technology: Cable television (upstream and downstream), Inter City Relay System (duplex), Harvard-WGBH telco link (duplex), Harvard Information Transfer System (upstream, downstream)

Sites: Gutman Library, Harvard University
Springfield Technical Community College

MCET Technical Assistance Program

Project Summary Sheet

Sponsor: Area Health Education Center, Boston University Medical Center

Titles:
HealthNET (first year programs):
"Results in a Landmark Study in Hypertensiveness"
"Rheumatoid Arthritis: When NSAIDs Fail"
"Rheumatoid Arthritis, continued"
"Congestive Heart Failure"
"Recurrent Peptic Ulcer Disease"
"Treatment of the Diabetic Foot"
"Chronic Osteomyelitis"

Dates:
February 27, 1987
March 13, 1987
March 27, 1987
April 10. 1987
April 24, 1987
May 1, 1987
May 15, 1987

Description: A one-hour, interactive continuing education service for physicians and nurses at Massachusetts neighborhood health centers. Continuing education units were available at no cost for participating professionals.

Technology: 23Ghz. microwave, Boston Catholic Television (ITFS), SportsChannel microwave and satellite networks, Inter City Relay System (east to west), cable television systems (downstream), audioconference

Sites: Boston University Law School (origination)

North Shore Community Health Center, Peabody
Manet Community Health Center, Quincy
Watertown Public Library
Greater Lawrence Family Health Center
Brightwood-Riverview Health Center, Springfield
Neighborhood Health Center, Springfield
Wesson Memorial Unit, Springfield
Wesson Women's Unit, Springfield

MCET Technical Assistance Program

Project Summary Sheet

Sponsor: Department of Physics and Astronomy, University of Massachusetts, Amherst

Title: "Physics Forum"

Dates: October, 1986 - June, 1987
September, 1987 - August, 1988

Description: A micro-computer based bulletin board and message service for high school physics (and chemistry) teachers in Massachusetts.

Technology: Voice grade "800" telephone number to microcomputer at UMass/Amherst

Sites: Statewide access

MCET Technical Assistance Program

Project Summary Sheet

Sponsor: Governor's Office of Economic Development

Title: "Creating the Future: Teamwork and Innovation in the Massachusetts Economy"

Date: September 22, 1986

Description: Governor Michael Dukakis discussed issues of economic policy with educators, labor leaders, business representatives, and college students.

Technology: 6 Ghz. microwave (New England Telephone Company), New England Sports Network satellite network, audioconference

Sites: (Origination) University of Massachusetts, Harbor Campus, Boston

Southeastern Massachusetts University, North Dartmouth
University of Massachusetts at Amherst
University of Massachusetts Medical Center, Worcester

MCET Technical Assistance Program

Project Summary Sheet

Sponsor: Boston University Center for the Study of Communications and Deafness; Deaf Media Coalition

Title: "Invisible Experiences"

Date: May 8, 1987

Description: Panel of six deaf adults and deaf moderator discussed methods of communication used in the education of the Deaf. The teleconference brought together parents of Deaf children, professionals working with the deaf, and members of the Deaf community.

Technology: 23 Ghz. microwave, Boston Catholic Television (ITFS), SportsChannel microwave and satellite network, Inter City Relay System, cable television (downstream), audioconference

Sites: (origination) Boston University Law School

Bunker Hill Community College, Boston
Southeastern Massachusetts University, North Dartmouth
Northern Essex Community College, Haverhill
South High Community School, Worcester
Springfield Technical Community College

MCET Technical Assistance Program

Project Summary Sheet

Sponsor: Massachusetts Department of Public Health

Titles: "Confronting AIDS on the Campus"
"Teaching AIDS in High School"

Dates: April 8, 1987
April 28, 1987

Description: In preparation for AIDS awareness week, the first teleconference involved college campus Deans of Students and Administrators in a discussion about AIDS education. The second teleconference, involving high school teachers, principals, and school committees, focussed on techniques for teaching high school students about AIDS.

Technology: 23 Ghz. microwave, SportsChannel microwave and satellite networks, cable television (downstream), audioconference

Sites: (origination) Bunker Hill Community College, Boston

4/8/87
University of Massachusetts, Boston
Northern Essex Community College, Haverhill
Southeastern Massachusetts University, North Dartmouth
Worcester Polytechnic Institute
Western New England College, Springfield

4/28/87
University of Massachusetts, Boston
Center for Field Services, University of Lowell
Southeastern Massachusetts University, North Dartmouth
Western New England College, Springfield
Berkshire Community College, Pittsfield
Wachusett Community College, Gardner
Wachusett Regional High School, Holden

MCET Technical Assistance Program

Project Summary Sheet

Sponsor: The Regional Math Network at Harvard Graduate School of Education

Title: "The Regional Math Network"

Date: May 12, 1987

Description: A national teleconference to present a model for a university run middle school mathematics teacher invigoration program. This teleconference was used to disseminate information gathered through a three-year National Science Foundation funded project at Harvard University.

Technology: 23 Ghz. microwave, SportsChannel microwave and satellite networks, audioconferencing

Sites: (origination) Bunker Hill Community College, Boston

Universities throughout the country

MCET Technical Assistance Program

Project Summary Sheet

Sponsor:	The Massachusetts Association for Mental Health, in cooperation with the Massachusetts Housing Partnership, and the New England Mental Health Commissioners Association
Title:	"The Housing Network: Phase I"
Date:	January 6, 1988
Description:	The two-hour teleconference involved the New England Mental Health Commissioners, Community and State Officials, Service Providers, Developers, and Financial Institutions representatives in a discussion about the technical assistance necessary for small provider organizations to construct/develop housing and accompanying services for the mentally disabled. The program featured presentation by Amy S. Anthony, Secretary of Communities and Development, and other mental health and housing experts.
Technology:	Cable television (upstream), SportsChannel microwave network, satellite (Galaxy 2), audioconferencing
Sites:	(origination) Sackler Center for Health Services Communications, Tufts Medical Center Augusta Civic Center, Maine Vermont Technical College, Randolph, Vermont New Hampshire Technical Institute, Concord, New Hampshire Rhode Island Hospital, Providence, Rhode Island University of Connecticut Health Center, Farmington, Connecticut

MCET Technical Assistance Program

Project Summary Sheet

Sponsor: The Annenberg / CPB Project, and MCET, in cooperation with the PBS Adult Learning Service

Title: "Telecourse Forum"

Date: May 2, 1988

Description: A five-hour event, integrating on-site discussion and teleconference presentation and interaction. The event involved higher education faculty and administrators in discussions about administrative and educational strategies for using distance learning resources. The teleconference featured telecourses developed through the Anneberg/ CPB Project and distributed through the PBS Adult Learning Service.

Technology: Satellite (Galaxy 2), audioconference

Sites: (origination) VIDEOCOM Satellite Associates, Dedham, MA

Bunker Hill Community College, Boston
Springfield Technical Community College
Southeastern Massachusetts University, North Dartmoth
Northern Essex Community College, Haverhill
Oxford High School
Berkshire Community College, Pittsfield

MCET Technical Assistance Program

Project Summary Sheet

Sponsor: French River Education Center, Massachusetts Department of Education's Bureau of Educational Technology

Title: "Technology in the Massachusetts Classroom"

Date: May 10, 1988

Description: A two-hour teleconference for teachers. The purpose of the event was to highlight technological innovations in Massachusetts classrooms that have been supported by the Chapter 188 Technology Grants Program.

Technology: 23 Ghz. microwave, cable television (upstream), SportsChannel microwave network, space segment (Galaxy), audioconference

Sites: (origination) Boston University Law School

Bunker Hill Community College, Boston
Northern Essex Community College, Haverhill
Southeastern Massachusetts University, North Dartmouth
Springfield Technical Community College
Berkshire Community College, Pittsfield

MCET Technical Assistance Program

Project Summary Sheet

Sponsor: Norwood Public Schools (Project SHINE)

Title: "Fresh Water: How Abundant Is It?"

Date: May 12, 1988

Description: The one-hour teleconference involved middle school students from seven communities. Its purpose was to provide an opportunity to learn about the role of the Massachusetts Water Resources Authority and our current water supply situation. It also permitted students from different communities to interact with each other.

Technology: Cable television upstream, SportsChannel microwave and satellite networks, cable television (downstream), audioconference

Sites: (origination) Cablevision of Brookline (students from Brookline)

E.W. Thurston Junior High School, Westwood
Norwood Senior High School
Walpole High School
Wayland High School
Ottosin Junior High School, Arlington
Martin Luther King, Jr. Middle School, Dorchester

MCET Technical Assistance Program

Project Summary Sheet

Sponsor: Deaf Media Collaborative, Somerville Community Access Television

Title: "The Politics of Deafness in the Four Corners of the Globe"

Date: May 25, 1988

Description: This teleconference brought an international panel of Deaf professionals and education experts together with Deaf people throughout the country. With representatives from six nations, this multilingual teleconference covered issues of empowerment for Deaf people, and their ability to shape their own lives and the lives of Deaf children in different cultures. The teleconference was nationally broadcast on The Learning Channel.

Technology: Mobile KU-band uplink (courtesy of WCVB-TV, Channel 5), satellite (Conus Communications), The Learning Channel satellite and cable television network, audioconference (voice and TTY)

Sites: (origination) Somerville Community Access Television

Nationwide cable television distribution, with organized sites in the following locations:

Boston Community Access and Programming Foundation
Cambridge Community Television
Chicago Access Corporation, IL
Gallaudet University Regional Center, Northern Essex Community College, Haverhill
Milwaukee Access Telecommunications Authority
Columbia University Teachers College, NY
Sacramento Community Cable Foundation, with the NorCal Center on Deafness, CA
National Technical Institute for the Deaf, Rochester, NY
Cable Access St. Paul, MN
Staten Island Community Television, NY
Tuscon Community Cable Corporation, AZ
Gallaudet University, Washington, D.C.

MCET Technical Assistance Program

Project Summary Sheet

Sponsor: Boston University, University of Massachusetts at Boston, and MCET, on behalf of the Boston Education Consortium for Communications Technologies

Title: "University Television Services"

Dates: February 1 through April 27, 1988

Description: The purpose of the project was to construct a model for an educational cable television channel managed and operated by a consortium of educational institutions. The project included over 100 hours cable programming, which consisted of instructional, public affairs and public service taped programs.

Technology: Local cable television channels (Boston Community Access and Programming Foundation and Brookline Community Cable), microwave interconnect

Sites: Cable television subscribers in Boston and Brookline

MCET Technical Assistance Program

Project Summary Sheet

Sponsor: Area Health Education Center, Boston University Medical Center

Titles: HealthNET (second year programs):
"Diabetes Mellitus"
"Scoliosis: 5, 10 & 15 Years Later"
"AIDS: Community Health Center Response"
"Hypertension"
"Depression and Young Mothers"
"Childhood Epilepsy: Part I"
"Childhood Epilepsy: Part II"
"Teen Pregnancy"
"Problems in Cardiac Pacing"
"Drug Interaction"
"Primary Care to Southeast Asian Youth"
"Violence and the Primary Care Physician"
"Outpatient Intra-Muscular Antibiotic Therapy"
"Depression and Anxiety in Young Women"
"AIDS: Women and Children"
"Pediatric Asthma"
"Breast Cancer"
"Viral Hepatitis"

Dates: October 2, 16, 30, 1987
November 13, 20, 1987
December 4,11, 1987
February 5, 19, 26, 1988
March 4, 11, 25, 1988
April 1, 22, 1988
June 3, 17, 24, 1988

Description: An interactive, one-hour continuing education service for physicians, nurses, nutritionists, social workers and dieticians at neighborhood health centers in Massachusetts. Continuing Education Units are available at no cost to participating health professionals.

Technology: 23 Ghz. microwave, cable television headend interconnect (Cablevision Boston/Brookline), SportsChannel microwave and satellite network, local cable television systems (downstream), audioconferencing

"Problems in Cardiac Pacing", February 19, 1988, integrated the use of audiographics for presentation and interaction

Sites: (origination) Boston University Law School

Fall River Community Development Service Center
North Shore Community Health Center, Peabody
Greater Lawrence Family Health and Service Center
Neighborhood Health Center, Springfield
Roxbury Comprehensive Health Care, Boston
Nantucket Cottage Hospital
Great Brook Valley Health Center, Worcester
Health Associates of Provincetown

MCET Technical Assistance Program

Project Summary Sheet

Sponsor: Area Health Education Center, Boston University Medical Center

Title: "Prevent Blindness"

Date: May 27, 1987

Description: A two-hour national teleconference for health care professionals. Continuing education units available at no cost to participants.

Technology: (same as HealthNET)

Sites:
Lowell Community Health Center
Outer Cape Health Center, Provincetown
Ethicon, Inc., Somerville, NJ
Ball Memorial Hospital, Muncie, IN
C.O.M. III, Columbus OH

MCET Technical Assistance Program

Project Summary Sheet

Sponsor: Cambridge Teleteaching Group, Harvard Extension School

Title: "Math E-1a Calculus"

Date: September - December, 1987

Description: This project demonstrated the educational applications of audiographics. A semester-long course in calculus was offered to teachers and other adults, including those entering higher education institutions requiring preparation and math skills. Telecommunications was used for lecture as well as on-line review sessions.

Technology: Voice grade telephone lines, audiographics equipment (on-premises)

Sites: Six Massachusetts sites

MCET Technical Assistance Program

Project Summary Sheet

Sponsor: MCET

Title: "Senator Kennedy Teaches Class"

Date: May 23, 1988

Description: Senator Edward M. Kennedy gave a lesson in American politics to high school students in Springfield and Boston. Using two-way interactive technology, Senator Kennedy and students in both locations were able to see and hear each other.

Technology: Cable television (upstream and downstream), SportsChannel microwave and satellite networks, Inter City Relay System (west to east), 23 Ghz. microwave

Sites: Central High School, Springfield
Dorchester High School, Boston

MCET Technical Assistance Program

Project Summary Sheet

Sponsor: Governor's Alliance Against Drugs

Title: "Governor's Alliance Against Drugs Fourth Birthday Celebration"

Date: January 4, 1989

Description: Governor Dukakis addressed school administrators, teachers, peer counselors, police, parents, treatment providers and elected officials from the 18 Massachusetts towns that helped to launch the Alliance's drug and alcohol prevention programs four years ago. The purpose of the teleconference was to discuss the progress made in each of these communities.

Participants were located at four sites. There was two-way video between Arlington (where the Governor spoke) and Springfield. The other two locations were able to see and hear each of these two sites, and interact via audioconference.

Technology: Mobile Ku-band uplink, Ku downlink, C-band uplink, SportsChannel satellite network, cable television (downstream)

Cable television (upstream in Springfield), Inter City Relay System (west to east), WGBH temporary microwave, cable television upstream/downstream (Arlington), audioconference

Sites: (origination) Arlington High School
(origination) Central High School, Springfield

Merrimack College, North Andover
Swansea High School

MCET Technical Assistance Program

Project Summary Sheet

Sponsor: Area Health Education Center, Boston University Medical Center

Titles: HealthNET (third year programs):
"Substance Abuse During Pregnancy"
"AIDS: for Teenagers"
"Oral Manifestations of AIDS and Treatment Considerations"
"Strategies for Working with IV Drug Users"
"AIDS: Issues of Latino Culture"
"Developmental Disabilities in HIV Positive Children"
"Outpatient Pneumonia"

Dates: September 23, 1988
October 7, 21, 1988
November 4, 18, 1988
December 2, 16, 1988

Description: An interactive teleconference series that is a continuing education service for physicians, nurses, social workers at neighborhood health centers. CEU's available to participating health care professionals.

Technology: (same as previous year)

Sites: (origination) Boston University Law School

Fall River Community Development Service Center
Greater Lawrence Family Health Center
Lowell Community Health Center
Cottage Hospital, Nantucket
North Shore Community Health Center, Peabody
Health Associates of Provincetown
Neighborhood Health Center, Springfield
Great Brook Valley Community Health Center, Worcester
Roxbury Comprehensive Health Center, Boston
Brightwood-Riverview Health Center, Springfield
Kimberly Quality Care, Boston
Little House Health Center, Dorchester

Note: Beginning January, 1989, HealthNET will be transmitted twice each month on The Learning Channel, providing continuing education service to health centers throughout the country. Because of

MCET Technical Assistance Program

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Participants were located at four sites. There was two-way video between Arlington (where the Governor spoke) and Springfield. The other two locations were able to see and hear each of these two sites, and interact via audioconference.

Technology: Mobile Ku-band uplink, Ku downlink, C-band uplink, SportsChannel satellite network, cable television (downstream)

Cable television (upstream in Springfield), Inter City Relay System (west to east), WGBH temporary microwave, cable television upstream/downstream (Arlington), audioconference

Sites: (origination) Arlington High School
(origination) Central High School, Springfield

Merrimack College, North Andover
Swansea High School

MCET Technical Assistance Program

Project Summary Sheet

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North Shore Community Health Center, Peabody
Health Associates of Provincetown
Neighborhood Health Center, Springfield
Great Brook Valley Community Health Center, Worcester
Roxbury Comprehensive Health Center, Boston
Brightwood-Riverview Health Center, Springfield
Kimberly Quality Care, Boston
Little House Health Center, Dorchester

Note: Beginning January, 1989, HealthNET will be transmitted twice each month on The Learning Channel, providing continuing education service to health centers throughout the country. Because of this change, necessary because of limited capacity available on the SportsChannel, approximately 50% of the Massachusetts Health Centers will no longer be able to participate in the live, interactive event.

Appendix 5

Support for an MCET Network

SUPPORT FOR AN MCET NETWORK

Educational leaders through Massachusetts have expressed an eagerness to use and support an educational telecommunications network. The following are excerpts from letters MCET has received in the past year:

> *I wish to assure you that Hampshire College stands firmly behind your efforts to promote a distance learning network. The key phrase for the remainder of this century is "economic competitiveness," and to be economically competitive [we] must take advantage of our technological edge. As is now widely recognized, that edge has been eroding over the past several decades, and recovery requires strong commitment to the vital areas of science, mathematics, teacher training and, of course, foreign languages in an increasingly international climate. Naturally, the resources to meet these needs are distributed unevenly .... we are able to bridge those wasteful gaps by linking together electronically. In an age when knowledge is currency, we can "share the wealth."*
>
> Adele Simmons, President of Hampshire College

> *A regional distance learning network would offer an excellent opportunity for improved instruction in those areas from which all schools -- large and small, urban and rural -- could benefit. We will be glad to promote the use of and participation in the network.*
>
> Deborah C. Loomis, President
> Mass. Secondary School Administrators' Association

> *I am convinced that the telecommunications network and evolving technologies are fundamental to resolving both immediate and long-term resource-related problems in education and will contribute to improvements in educational quality. I look forward to working with MCET and its affiliated organizations and individuals for the benefit of higher education, for our school-age population, and for the educational needs of all citizens of the Commonwealth.*
>
> James F. Crain, Chairman, Massachusetts Board of Education
> Vice President, New England Telephone Compnay

I support your [MCET's] work in developing a viable distance learning network and committed to helping implement an educational television program that will pique the interest of both students and teachers in the classroom in developing better approaches to teaching math, science, and foreign languages. Massachusetts is willing and able to utilize this new technology to develop a student's interest in these subjects and to help give out teachers the training they need to communicate effectively with students of all backgrounds.

Nicholas A. Paleologos
Massachusetts House Chairman
Committee on Education, Arts and Humanities

Emerson College, because of its special mission, is in a unique position to be of assistance in a regional distance learning network. We are not just willing but eager to be active users of and participants in such a network.

Dr. Allen Koenig, President, Emerson College

The Massachusetts Teachers Federation has already designated teacher representatives to help establish educational programs for Massachusetts students working with the Massachusetts Corporation for Educational Telecommunications. We believe the expanded use of distance learning made possible through the use of telecommunications will vitally impact education and the region's future economic prosperity.

Paul L. Devlin, President, Mass. Federation of Teachers

We believe that the MCET program will not only benefit the school children and citizens in our state, but that it also serve as an example that will be used around the country ... MCET can make wise and effective use of satellite technology to go beyond simply remedying some of the deficiencies of participating schools. The ultimate promise of this technology is to make education more personal and engaging as well as richer in content and more up-to-date.

John R. Silber, President of Boston University

...Local communities lack the necessary resources to provide proper instruction in [such areas as math, science and foreign languages]. This fact, along with declining enrollments, has left many students without the opportunity to take courses in key areas. The MCET proposal describes the potential to eliminate the geographic obstacles and make instruction available to those who need it...

Edward M. Kennedy, United States Senate

Holyoke Community College will encourage, support, and participate in a regional distance learning network. The proposed network will enable the College to share resources and expertise with teachers and students .... There is no doubt that opportunities for teaching and learning will be enhanced.

David M. Bartley, President, Holyoke Community College

As I think you know, the University of Lowell is a pioneer in the development and operation of interactive video telecommunications for instruction.... Because of our unique experience in Massachusetts we believe that we could both benefit from and contribute to [a network].

William T. Hogan, President, University of Lowell

Because we are not located near large population centers in the region, developing a distance learning network is particularly important to us. You can rest assured that this campus will participate wholeheartedly in developing programs that use current telecommunications technology to help ... schools serve their students more effectively.

Joseph Duffey, Chancellor
University of Massachusetts at Amherst

Mount Wachusett Community College would welcome enthusiastically the opportunity to participate in the development of a distance learning network.

Daniel M. Asquino, President
Mount Wachusett Community College

We at Massasoit Community College are very much interested in participating in a network for sharing resources in an era when both basic and technical skills are becoming increasingly important. We would most certainly want to be involved in this network, and ask that you please inform us if we can be of assistance.

Gerard F. Burke, President, Massasoit Community College

We pledge our support, participation and active use of such a network and will work tirelessly toward its success.

Lincoln D. Lynch, Executive Secretary
New England Association of School Superintendents

This University is committed to the [Southeast Massachusetts] region and its future. It intends to be an active resource to and for all school systems in the region. Substantial headway can and will be made in this effort through the development and operation of a long-term distance learning network. The University stands ready to assist MCET to build and operate a statewide distance learning network so that students and professionals throughout the state can share a greatly enhanced learning environment.

John R. Brazil
President, Southeastern Massachusetts University

Some schools districts may not be able to offer advanced placement math, science and foreign language classes or professional development for teachers. Regional distance learning networks enable them to link with other school districts who also might not be able to support such programs on their own. Once linked these districts all have the opportunity to share the cost and significant benefits of the programs.

Richard A. Kraus, Massachusetts Senate

We [University of Lowell] are committed to long-term involvement in the distance learning network and look forward to working with MCET on this exciting opportunity.

Dr. Donald E. Pierson, Director
Center for Field Services, University of Lowell

You have the commitment of the talented faculty of Fitchburg State College in both the Industrial Technology and Communications/Media departments to assist in making this an enduring -- perhaps historic -- contribution to the field of education.

Vincent J. Mara, President of Fitchburg State College

Preparing students to enter high-technology fields provides stable job opportunities and helps them achieve success...MCET's plan is a creative and cost-effective way to improve instruction in those crucial areas of mathematics, science and foreign languages. By developing programs that can be sent to many different schools, schools with fewer resources and underserved and excluded populations can enjoy the same high-quality instruction as schools with greater resources.

Eileen Farley, President, Bristol Community College

...I have observed firsthand the increasingly competitive international marketplace and the challenges it presents Massachusetts' business community today. For tomorrow's business leaders, the challenges to compete successfully in world markets will be even greater...[I recognize] that the use of educational telecommunication programs can be an effective tool in providing betters instruction in these subject areas to the region's students as well as an aid to improved teacher training...

Andrew C. Bagley, Executive Director
Commonwealth of Massachusetts
Office of International Trade and Investment

The Massachusetts Corporation for Educational Telecommunications is well-positioned to coordinate and support the implementation of the proposed learning network. This system will leverage the available expertise by providing wide access to specialized resources and instructional skills. The network will not only help to improve instruction in critical areas, but will facilitate the professional development of teachers. It will permit the optimal utilization of the region's unique educational resources...M2C [Massachusetts Microelectronics Center] will actively encourage utilization of the network. Moreover, the Center is willing to participate in the project by having relevant aspects of its activities disseminated to classrooms through the network. We see this as a means of increasing awareness of, and interest in an important technology.

Karl Weiss, Vice Chairman of the Board
Massachusetts Technology Park Corporation
(Vice President, Northeastern University)

America's future competitive position in the international economic community is dangerously fragile and perilous. We are in jeopardy because our next generation of workers lack the technological knowledge which their contemporaries abroad possess...Educational telecommunications offers the opportunity to remedy these problems by using satellites and other technologies to carry educational programming across distances...

Chester G. Atkins, United States Congress

The success of a long-term effort in the development and maintenance of a distance learning network will depend on the willingness of many people and institutions to see that our collective futures depend on collaboration. We are prepared to do what we can in making that dream become a reality.

Catherine A. Tisinger, President, North Adams State College

Appendix 6

Existing Distance Learning Resources

Distance Learning Resources

Service: **California State University, Chico**

Contact:
Leslie J. Wright
Associate Dean, Regional and Continuing Education
California State University, Chico
Chico, CA 95929-0250
(916) 895-4020

Sector Served: Corporate professional and continuing education/retraining. Satellite delivered education directly to industry.

Description: Degree programs/courses offered LIVE via satellite, with some core courses available on videotape.

For example, Chico State offers a M.S. degree in Computer Science and/or a B.S. degree in Computer Science, Systems Option.

Price Structure:

$15,000 initial buy-in fee plus $1,275/student/course.

Potential Network Savings: Negotiable

Distance Learning Resources

Service: **National Technological University (NTU)**
P.O. Box 700, 601 S. Howes Street
Fort Collins, CO 80522
(303)484-6050
FAX(303)484-0668

Sector Served: Technical Professionals: engineers, scientists and technical managers

Description: NTU is a private, non-profit institution founded to serve the advanced needs of today's busy highly mobile engineers, scientists and technical managers. The NTU National Satellite Network provides advanced education to technical professionals in the United States. NTU coordinates instruction offered by 24 major universities and offers Master's of Science degrees in: Computer Science, Computer Engineering, Electrical Engineering, Engineering Management and Manufacturing Systems Engineering.

NTU Satellite Network also offers non-credit short courses, seminars and workshops on leading edge engineering and computer topics. Delivered via satellite, the participants at the teleconferences can talk back to the teachers via the phone.

Price Structure:

One-time Access Fee (payable over two-years)	
under 500 employees on-site, up to 2,000	$ 8,000
over 2,000 employees on-site	$24,000
Corporate-wide Access Fee (domestic employees)	
under 20,000 employees, up to 100,000	$ 65,000
greater than 100,000 employees	$260,000

Tuition: $385/credit
Audit: $285/credit

Potential Network Savings: Negotiable

Distance Learning Resources

Service: **National University Teleconference Network (NUTN)***

Oklahoma State University Campus
332 Student Union
Stillwater, OK 74078-0653
phone: (405) 744-5191

*NUTN also has an International Division

Sector Served: Accredited post secondary institutions of higher education with access to audio, satellite downlink, computer facilities and equipment are eligible for membership in NUTN. Members include faculty, staff, business and industry personnel, mid and upper management, several million traditional students and a continuing education market numbering in the millions.

Description: NUTN is a consortium of over 250 institutions of higher education which united to develop a telecommunications system for higher education. It provides full teleconference services for both members and external groups. Members receive audio, video and computer conferences, member training materials., annual training conferences, and regular computer "updates." External groups receive desirable locations for their programs, and assistance in program coordination from local program coordinators, educators and/or consultants.

*International Division:

To institutions and government officials outside the United States , NUTN offers access to the American higher education community through its network of over 250 member institutions. To its members in North America, NUTN offers news and announcements of programmatic activity in other countries. The exact nature of the International Division will evolve over time.

- continued -

National University Teleconferencing Network (NUTN)
- Continued -

Price Structure:

	FULL	CAM*	Group (11+)
One-time Initiation Fee	$ 800	$ 600	$ 400
NUTN/Forum (Computer Conf.)	200	150	150
Annual Fee	1,500	1,200	900

*Cooperating Adjunct Member (CAM): One - ten institutions aligned with a principal member within the same city, county or state.

International Division: Colleges	$1,000
Government agencies/private groups	$3,000

Potential Network Savings:

See Cooperating Adjunct Member (CAM) and Group rates.

Distance Learning Resources

Service:	**Satellite Communication for Learning Worldwide (SCOLA)** 2500 California Street Omaha, NE 68178-0778 Phone: (402) 280-4063 FAX: (402) 280-2336 TELEX: 438119
Sector Served:	Anyone interested in a variety of foreign 'LIVE' newscasts. For examples, SCOLA programming is utilized by language schools, cable systems and anyone interested in public affairs programming.
Description:	SCOLA is a non-profit, tax exempt, non-sectarian consortium of colleges and universities which provides its members with foreign LIVE or 'near-LIVE' news and information via satellite. It presently operates seven hours a day in 13 different languages and projects 24 hours by 1990. In addition, each of the foreign newscasts is available translated into english for those unable to speak the language.

Price Structure:

Individual costs $100/year

Schools with up to 1,000 students, $.79/student
1,000 to 10,000 students, $.63/student
100,000 students rate drops to $.10/student

CABLE television costs about $.10/subscriber

Potential Network Savings:

Corporate and consortium rates are negotiable.

Distance Learning Resources

Service: **PBS Adult Learning Satellite Service (PBS ALSS)**
1320 Braddock Place
Alexandria, VA 22314-1698
(703) 739-5360
(800) ALS-ALS8

Sector Served: Continuing education for colleges and their communities.

Description: The PBS Adult Learning Satellite Service (ALSS) offers colleges convenient and cost effective direct satellite access too a broad range of quality educational programming. Through ALSS your college can acquire complete television courses, resource programming, lectures, LIVE video conferences and other programming. You can use this programming in a variety of ways to increase distance learning opportunities; enrich classroom instruction; update faculty and administrators; expand community service; and enhance professional and career education.

Price Structure:

Basic ALSS Charter Participation fee		$2,500
	4 to 19 colleges	2,250 each
Special consortia rates,	11 to 15 colleges	2,000 each
	16 to 20 colleges	1,750 each
	21 or more	1,500 each

Telecourse licenses generally cost between $300 - $700 plus an additional student tuition fee of $15/student.

Members receive:
- reduced license fee,
- free access to resource programs,
- free previewing of all programs,
- video-cipher rebate, and
- off-air taping licenses available at a significant savings from purchasing video cassettes

Potential Network Savings: See price structure

Distance Learning Resources

Service: **PBS National Narrowcast Service (NNS)**
1320 Braddock Place
Alexandria, VA 22314-1698
(703) 739-5300

Sector Served: Corporations, public agencies and educational institutions.

Description: A programming service designed to deliver a wide selection of high quality, video-based training experiences for businesses. NNS offers access to pre-produced videos, LIVE, interactive training courses and exclusive teleconferences. Programming is available virtually every day. In the course of a year, NNS offers over 70 video-based courses and 25 LIVE events.

Price Structure:

NNS Annual Associate Fee is $500/site in addition program viewing works on a Pay-Per-Program basis ranging from $150/event to $2,000/event. Permission to record a program and/or to interact in a program is an additional charge.

Potential Network Savings:

Multiple site and/or network rates are dependant on the number of sites and how each site plans on interacting with each other and with PBS National Narrowcast Service.

Distance Learning Resources

Service: **TI-IN Network**
1000 Central Parkway North, Suite 190
San Antonio, TX 78232

Contact: Ms. Jo Babic, Manager of Marketing
(713) 554-5545
(800) 999-8446

Sector Served: K-12 students and teachers

Description: TI-IN is a national satellite network providing educational opportunities to public school students and teachers. The satellite instructional system offers LIVE, interactive programming that includes such high school credit courses as mathematics, foreign languages, computer science, psychology and government as well as inservice instructional programs for teachers.

Price Structure:

One time cost for antenna installation and AV unit in classroom	$9,000
Yearly subscription fee, includes maintenance for both leased and purchased equipment	5,250

Potential Network Savings: Unknown

Distance Learning Resources

Service: **AMA (American Management Association) by Satellite**

Contact:
Ms. Joan Milczarski
American Management Association
135 West 50th Street
New York, NY 10020
(212) 903-8115

Sector Served: Sector includes; business, government, colleges and hospitals including non-profit organizations. Members of the American Management Association as well as members of the Public Service Satellite Consortium (PSSC).

Description: LIVE videoconferences and videocassettes presented by the American Management Association (AMA) and coordinated by the Public Service Satellite Consortium (PSSC). Conferences are designed to train organizations in current applications and trends in the industry.

Price Structure:

Number of Sites	AMA/PSSC Member	Non Member Rate	For Taping Rights Add
1	$379	$399	$25 (one tape/site)
2-100+	$379 + $250/ addtl. site	$399 + $250/ addtl. site	$25/site
2-20	$3,150	$3,500	$199
21-99	$6,750	$7,499	$445
100+	$8,955	$9,950	$590

Licensees for the live broadcasts may choose from two different fee options. The first option charges a fee for each viewing site. The second option is a flat fee for private networks based on the number of sites in the network.

Videotape sales: Organizations without a satellite dish may order 1/2" videotape. The first tape is $424 (non member) and $404 (AMA/PSSC member). Each additional tape costs $250.

Potential Network Savings: See price structure.

Service:	**Arts and Sciences Teleconferencing Service (ASTS)** College of Arts and Sciences Oklahoma State University Stillwater, OK 74078 (405) 744-6254
Contact:	Leigh Walters
Sector Served:	K-12 students, teachers, business, higher ed.,
Description:	Oklahoma State University's ASTS delivers courses for K-12 students in German I and II, Russian I, AP Physics, AP Chemistry, AP Calculus, Trigonometry/Analytic Geometry, Applied Economics/AP American Government; and Basic English and Reading for grades 7-8.

The **College of Agriculture** produces ad hoc programming;

The **College of Business** produces teleconferences with business leaders for Business and University people;

The **College of Education** provides staff development training for teachers (K-12);

The **College of Engineering** is a producing member of NTU (see National Technological University);

The **College of Home Economics** produces teleconferences which specialize in marketing and sales for the small retail business owner and those interested in marketing fashion apparel;

The **Midlands Consortium Star Schools Project** is operating its $5.5 million grant from Oklahoma State University (see Midlands Consortium Star Schools Project); and

Oklahoma State University is the headquarters for **NUTN** (see National University Teleconferencing Network)

- Continued -

Arts and Sciences Teleconferencing Service
Oklahoma State University
- Continued -

Price Structure:

Student fee is on a per course basis:

1 student,	$ 600.00	4-10 students,	$2,400
2 students,	1,200.00	10+ students	$100 extra/student
3 students,	1,800.00		

Conferences are priced individually.

Potential Network Savings: See Price Structure

Distance Learning Resources

Service: American Hospital Association (AHA)
840 N. Lakeshore Drive
Chicago, Il 60611
(312) 280-6157

Sector Served: Health Care Industry

Description: AHA produces hospital management programs via satellite and consults on ad hoc video production.

Price Structure: $300/show/site

Potential Network Savings: Unknown

Distance Learning Resources

Service: **Midlands Consortium Star Schools Project**

Contact:

Malcom Phelps, Assistant Director
Midlands Consortium Star Schools Project
Oklahoma State University
309 North Cordell
Stillwater, OK 74078
(405) 744-8131

Kenneth McKinley
Project Director
Midlands Consortium Star Schools Project
Oklahoma State University
408 Classroom Building
Stillwater, OK 74078
(405) 744-6508

Sector Served: K-12, mostly secondary; elementary Spanish, teacher training

Description: The Midland Consortium Star Schools Project (MCSSP) is the recipient of a $5.5 million award to implement a Star Schools demonstration project. The MCSSP is one of four organizations granted funding from the $19 million appropriations from the U.S. Department of Education for this purpose.

The primary purpose of the newly formed multi-state MCSSP is to demonstrate the effectiveness of providing live, interactive satellite-based instructional programs. Direct student instruction and teacher training will be provided in the critical subject areas of math, foreign language and sciences.

The MCSSP proposes to equalize academic resources in schools by overcoming barriers of geography, wealth, race and culture. The partners in the Midlands Consortium include: the University of Alabama in Birmingham; the University of Kansas; Kansas State University; the Missouri School Board Association; the Missouri State Department of Education; the University of Mississippi; and Oklahoma State University.

- Continued -

Midlands Consortium Star Schools Project
- continued -

Price Structure: Student fee is on a per course basis:

1 student, $ 600.00
2 students, 1,200.00
3 students, 1,800.00
4-10 students, $2,400
10+ students $100 extra/student

Staff development conferences are priced individually.

Potential Network Savings: See Price Structure

Service: **Hospital Satellite Network (HSN)**
2020 Avenue of the Stars
Los Angeles, CA 90067

(213) 277-6710

Contact: Rick VanHorn, Vice President

Sector Served: Health care industry, primarily Hospitals

Description: HSN provides training and educational programming directed to physicians, nurses, allied health professionals and hospital administrators. Programming is beamed via satellite into some 1,000 subscribing hospitals. Additionally HSN produces video conferences and other special events that are underwritten by sponsors through its Access Division. Most Access programs award continuing education credits for viewers.

HSN programming is encrypted with Oak Orion.

Price Structure:

Cost varies. There are 4 subscriber service modules. Information on cost available by calling HSN directly.

Potential Network Savings: Unknown

Distance Learning Resources

Service: **The Learning Channel (TLC)**
1525 Wilson Boulevard, Ste. 550
Rosslyn, VA 22209
(703) 276-0881

Contact: Susan Katz, Director of Marketing

Sector Served: Educational Programming for the whole family.

Description: The Learning Channel is the premier educational cable network. Programming combines formal and informal educational programs including; college-credit telecourse series, health care continuing education, pertinent business and career development; and stimulating hobby, self-improvement and personal enrichment programming.

Price Structure:

Work primarily with cable industry @ $.60/subscriber/year.

Potential Network Savings: Negotiable

Distance Learning Resources

Service:	**Executive Communications** Pittsburgh, PA (800) 331-5190 or (412) 967-2736
Sector Served:	Health care professionals, including doctors and nurses, and corporate management.
Description:	Training programs from the Hamarville Rehabilitation Center for medical professionals. For general corporate management, Executive Communications produces an eight program series, "ManagemenTVision." Their most recent series for management training included programs on corporate cultures, entrepreneurship, and creativity within the corporate culture.

Price Structure: Unknown, clients pay after program is telecast

Potential Network Savings: Unknown

Distance Learning Resources

Service: **Black College Satellite Telecommunications Network (BCSTN)**
Howard University
P. O. Box 961
Washington, DC 20059
(202) 636-6100

Contact: Dr. Mabel P. Phifer,
Director, Office of Satellite Communications

Sector Served: Membership is primarily historically and predominantly black colleges and universities, but also, has grown to include federal agencies, churches, and national organizations (ie. sorority, conventions).

Description: Black College Satellite Telecommunications Network provides full production capabilities with uplinking. Signal is usually via Ku-band, but can be converted to include C-band. Member campuses provide special event programming and courses, including; Introduction to Physiology, Engineering, Political Empowerment, Basic Education and Literacy.

In addition to member institutions BCSTN also collaborates with 250 cable stations who have agreed to carry live and pre-taped programming. BCSTN also utilizes a data network (SMARTNET) which links campuses.

Price Structure:

- Member campuses pay $5,000/year for air time
- Cost for courses is negotiated with the developing institution.
- Special event programs have a one time program fee, or are free.

Potential Network Savings: Unknown

Additional National Distance Learning Resources

American Law Network (ALN)
American Rehabilitation Network (AREN)
Applied Business teleCommunications (ABC)
Association for Educational Communication's and Technology/Virginia Tech.
Automotive Satellite Television Network (ASTN)
CPA-TV Network
Computer Channel, Inc.
Continuing Legal Education Satellite Network (CLESN)
Institute of Electrical & Electronics Engineers (IEEE)
Institutional Research Network (IRN)
Satellite Education Network

Appendix 7

Northeast Star Schools Program Proposals

NORTHEAST STAR SCHOOLS PROGRAM

Program Proposals from Massachusetts Institutions

App. No.	Institution	Title	Collaborating Institutions
005	West MA 5 College/Pub Sch Part	Distance Learning Project Team	45
006	South Berkshire Educ Collab	Interactive Telecomm. Project	7
007	Mt Wachusett Community College	Down-to-Earth in Math/Science	5
014	Massachusetts Maritime Academy	Resources in Marine Science	4
016	Fitchburg State College	Proj Tech. Literacy Curriculum	12
018	Plymouth-Carver Regional Schls	S. E. Regional Tech P.C. Net	2
019	Ayer High School	Two Way T.V. Teacher Training	4
020	The Education Cooperative	Oceanic Studies	12
021	WGBH Educational Foundation	Introduction to Japanese	7
022a	Cambridge Teleteaching Group	Teleteaching Proj. French Film	4
022b	Cambridge Teleteaching Group	Math Teacher Enhancement	6
024	Greenfield Community College	Pioneer Valley Math Project	7
025	Bunker Hill Community College	Star School Elementary Science	3
026a	University of Mass. Boston	Telemath Project	3
026b	University of Lowell	ERNIE	15
026c	Northeastern University	Discrete Math	3
026d	Northeastern University	Science News Digest	5
026e	Northeastern University	Distance Learning Educ'l Tech	3
026f	Northeastern University	Video Enrichment Consumer Math	4
026g	Northeastern University		1
026h	Southeastern Mass. University		1
027A	Educational Development Center	New Approaches/Elem. Science	2
027b	Educational Development Center	Low Achievement/Math	6
027c	Educational Development Center	Using Techn./High School Math	0
028	Boston University	The Big Ideas	4
029	UMass/Amherst School of Ed.	Math English Science Tech. Ed.	6
030	Pittsfield Public Schools	Sharing Teaching & Learning	4
031b	UMass/Amherst	Pioneer Valley/Foreign Lang.	13
031c	Institute Govt. Services UMass	Statistical Process Control	7
036	Springfield Tech Comm. College	Enhancing Public School Curric	5
039	Boston Museum of Science	Pre-Visit Planning	9

NUMBER OF PROGRAM PROPOSALS: 31

TOTAL NUMBER OF COLLABORATING INSTITUTIONS: 209

NORTHEAST STAR SCHOOLS PROGRAM

Program Proposal Summary

Project Title: Distance Learning Project Teams

Institution: Western Massachusetts Five College/Public School Partnership

Type of Project: Student teleconferences: 1/class/week, estimated 20 minutes each, using electronic bulletin board,
Teacher teleconference: 3 per week, each 20 minutes, using electronic bulletin board.
Course enhancement: teacher-developed curriculum in math, science, foreign language.

Curriculum Area: Mathematics: secondary grades, especially discrete/modeling
Science: elementary life science, junior high space
Foreign language: French, Spanish initially

Teacher Training: Telecommunications, curriculum development using inter-school, telecommunications based capabilities

Target Audience: Students in grades 3-12
Teachers of grades 3-college

Summary: To train teams of school and college faculty in mathematics, elementary science, foreign languages, and space science to develop inter-school student projects mediated by telecommunications.

Collaborating Institutions: Five Colleges, Inc.; the school systems of Hampden, Hampshire, Franklin and Berkshire Counties (44 school districts)

NORTHEAST STAR SCHOOLS PROGRAM

Program Proposal Summary

Project Title: Interactive Telecommunications Project

Institution: South Berkshire Educational Collaborative

Type of Project: Student telecourses totaling 45 hours, teacher training telecourses totaling 30 hours and course enhancement using teacher curriculum development for interactive television.

Curriculum Area: A.P. Calculus, Computer Science, Physics, Chinese, Russian, German, Spanish, Latin and French.

Teacher Training: Curriculum development in all courses offered via interactive television.

Target Audience: Teachers and students in grades 9-12.

Summary: To develop the proposed system for utilization in this rural area of the Berkshires for schools to share resources.

Collaborating Institutions: South Berkshire Educational Collaborative and the schools districts of Berkshire, South Berkshire, Lenox, Lee, Smith College, and State University of New York.

NORTHEAST STAR SCHOOLS PROGRAM

Program Proposal Summary

Project Title:	Down-to-Earth Math/Science
Institution:	Mount Wachusett Community College
Type of Project:	Series of ten half-hour videotaped teacher training telecourses.
Curriculum Area:	Mathematics and Science
Teacher Training:	Telecourses in Marine Biology and Mathematics.
Target Audience:	Teachers and students of grades K-12.
Summary:	To train teachers on the integration of Marine Biology and Mathematics into the K-6 curriculum using Mount Wachusett's Down-to-Earth Math/Science grant and the College's collaboration with the Northeast Marine Environmental Institution.
Collaborating Institutions:	Mount Wachusett Community College, Northeast Marine Environmental Institution, and the school districts of Gardner, Fitchburg, Leominster, and Westminster.

NORTHEAST STAR SCHOOLS PROGRAM

Program Proposal Summary

Project Title: Distance Learning Resources in Marine Sciences for Chapter 1 School Teachers and Students

Institution: Massachusetts Maritime Academy

Type of Project: Ten half-hour student teleconferences and 45 hours of teacher training teleconferences.

Curriculum Area: Spherical Trigonometry and Marine Science.

Teacher Training: Telecommunications curriculum development in Marine Science.

Target Audience: Teachers of grade levels K-12 and students in grades 9-12.

Summary: To develop and implement outreach and enrichment programs to attract minority students to the marine science field, in which they are currently underrepresented.

Collaborating Institutions: Massachusetts Maritime Academy, the City of Boston School Department, Alexander Hamilton School, Falmouth High School and Bourne High School.

NORTHEAST STAR SCHOOLS PROGRAM

Program Proposal Summary

Project Title: Project Technological Literacy Curriculum

Institution: Fitchburg State College

Type of Project: One three-hour teacher training telecourse per week in the area of Technology Literacy.

Curriculum Area: Technology Literacy: increasing technological literacy among students in elementary, secondary and vocational levels, specifically incorporating math, science and computer interface with technology.

Teacher Training: 180 hours of interactive teacher training telecourses.

Target Audience: Technology Education Teachers of grade levels K-12.

Summary: To maintain "state of the art" technological literacy among teachers in vocational/occupational and comprehensive schools systems in New England.

Collaborating Institutions: Fitchburg State College and the school systems of New Bedford, Watertown, Westfield, Drury, Salem, Worcester, and Foxboro; Cape Cod Regional Technical High School, Westbrook High School, (Maine) and Ponaganset School (North Scituate, Rhode Island).

NORTHEAST STAR SCHOOLS PROGRAM

Program Proposal Summary

Project Title:	The Southeast Regional Technical Collaborative P.C. Net
Institution:	Plymouth Carver Regional Schools
Type of Project:	Student interactive telecourses, using computer and telephone conferencing. Teacher interactive training telecourses using the same technology. Course enhancement includes instructional media using live satellite transmission to four secondary campuses for Earth Science programs with a minimum of 560 satellite transmissions lasting 43 minutes each.
Curriculum Area:	Calculus, computer science, A. P. biology, honors physics, and geology.
Teacher Training:	Computer hardware and software use, and interactive course development.
Target Audience:	Teachers and students of grade levels 8-12.
Summary:	A master teacher will develop and implement interactive telecourses to three high schools by using networked computer workstations and live cabled video with telephone conferencing.
Collaborating Institutions:	Plymouth-Carver Regional School District and Bridgewater State College.

NORTHEAST STAR SCHOOLS PROGRAM

Program Proposal Summary

Project Title: Two Way T.V. Teacher Training

Institution: Ayer High School

Type of Project: 45-47 hours of teacher training telecourses (interactive and on-site)

Curriculum Area: Advanced calculus and micro-biology.

Teacher Training: Training in the area of television equipment operation and television program production.

Target Audience: Teachers of grades 9-12.

Summary: To expand the Nashoba Electronic Educational Network at Ayer High School for training teachers in the use of existing television equipment and the production of lessons to be broadcast over the network.

Collaborating Institutions: Ayer High School, The University of Lowell Center for Field Studies, and the school systems of Concord-Carlisle, Chelmsford, and Dracut.

NORTHEAST STAR SCHOOLS PROGRAM

Program Proposal Summary

Project Title:	Oceanic Studies: Implications for Future Problem Solving
Institution:	The Education Cooperative
Type of Project:	Three two-hour student teleconferences and 32 hours of teacher training teleconferences. Video disks will be utilized for course enhancement.
Curriculum Area:	Marine Biology and the social implications thereof.
Teacher Training:	Teachers will be trained to learn about the ocean as a resource and how to look at future implications for solving problems (such as wastes and food).
Target Audience:	Teachers and students of grade levels K-12.
Summary:	The primary focus of year one will be teacher training (provided by Specialist at the New England Aquarium) to develop educators' competence in key issues relating to marine studies. Year two will implement the teachers' new knowledge to students in the classroom setting.
Collaborating Institutions:	New England Aquarium, school systems of Needham, Wellesley, Wayland, Natick, Holliston, Walpole, Norwood, Westwood, Dover-Sherborn, and Dedham.

NORTHEAST STAR SCHOOLS PROGRAM

Program Proposal Summary

Project Title:	Introduction to Japanese
Institution:	WGBH Educational Foundation
Type of Project:	Live interactive student telecourse accompanied by Teacher training component.
Curriculum Area:	Japanese (second year to include Chinese)
Teacher Training:	Train teachers to integrate computers and other technologies into curriculum through use of videodiscs.
Target Audience:	Beginning Students in Japanese.
Summary:	To create a Japanese curriculum for secondary school students and integrate the use of computers. Teacher training will in the use of provided course materials, videodiscs, computers and telecommunications.
Collaborating Institutions:	WGBY, three Springfield Public Schools and three Boston Public Schools.

NORTHEAST STAR SCHOOLS PROGRAM

Program Proposal Summary

Project Title: The Cambridge Teleteaching Group (CTG) Teleteaching Project - French Film

Institution: Cambridge Teleteaching Group

Type of Project: 42 hours each of both student telecourses and teacher training telecourses.

Curriculum Area: French

Teacher Training: Interactive teleconferences.

Target Audience: Teachers and students of grade levels 9-12.

Summary: To invigorate the French advanced placement curriculum and to develop foreign language teaching skills through interactive audio/video/graphics conferencing.

Collaborating Institutions: Harvard Extension School, Medway High School, Milton Academy, and Concord Academy.

NORTHEAST STAR SCHOOLS PROGRAM

Program Proposal Summary

Project Title: Mathematics Teacher Enhancement Network

Institution: Cambridge Teleteaching Group

Type of Project: Live, interactive teacher training telecourses using Optel Telewriter audiographics/video system.

Curriculum Area: Mathematics

Teacher Training: Mathematics including functions, graphs, equations, applications and A.P. Calculus.

Target Audience: Teachers of grade levels 9-12.

Summary: To enhance the mathematics curriculum and develop mathematical teacher skills through interactive audio graphics and video conferencing.

Collaborating Institutions: Harvard Extension School, Medway High School, Boston Public Schools, Lowell High School, South High School (Worcester), and Plymouth Carver Intermediate School.

NORTHEAST STAR SCHOOLS PROGRAM

Program Proposal Summary

Project Title: Pioneer Valley Mathematics Distance Learning Project

Institution: Greenfield Community College

Type of Project: 1,050 hours of teacher training teleconferences.

Curriculum Area: Mathematics

Teacher Training: Arithmetic, Algebra, Geometry, Calculus, and Trigonometry for elementary and secondary levels.

Target Audience: Teachers and students of grade levels K-12.

Summary: Improvement of elementary and secondary instruction in mathematics by providing a comprehensive teacher training program which includes telecourses, teleconferences and on-site demonstration lessons.

Collaborating Institutions: Greenfield public schools, Gill Montague Regional School, Pioneer Valley Regional School, Mohawk Regional Schools, Frontier Regional Schools, North Adams State College, and Brattleboro Public Schools (Brattleboro, Vermont).

NORTHEAST STAR SCHOOLS PROGRAM

Program Proposal Summary

Project Title:	Star Schools Elementary Science Teacher Training Program
Institution:	Bunker Hill Community College
Type of Project:	Interactive Teacher Training using telecommunications workshops
Curriculum Area:	Elementary Science
Teacher Training:	Three live, interactive teleconferences on the process approach to teaching.
Target Audience:	Teachers of elementary science
Summary:	To pilot three telecommunications workshops which will include the "Process" approach to teaching science; applications sessions using curriculum and science kits; and a final evaluation session at the College of selected participants who attended the teleconferences, to evaluate the pilot program for wider dissemination.
Collaborating Institutions:	School departments of Chelsea, Everett and Malden.

NORTHEAST STAR SCHOOLS PROGRAM

Program Proposal Summary

Project Title: Telemath Project

Institution: University of Massachusetts at Boston

Type of Project: Three schools will be targeted in order to enhance and reinforce teaching skills of teachers in these schools.

Curriculum Area: Mathematics

Teacher Training: A math teacher in each school will serve as instructional and technical coordinator for that site to identify specific interactive/video computer systems and software required for instruction and teacher training.

Target Audience: Math teachers in these three schools, and eventually the students.

Summary: The instructor at each school, together with UMass/Boston staff will meet to review, select and design materials which emphasize interactive computer-assisted instruction, teleclass, and teleconferencing, as well as electronic mail and bulletin boards. Finally, the teachers will create methods for integrating selected resources and strategies into the existing curriculum, utilizing available hardware enhanced by the addition of telecommunications capabilities.

Collaborating Institutions: Boston Public Schools including Dorchester High School, South Boston High School, and the J. E. Burke High School.

NORTHEAST STAR SCHOOLS PROGRAM

Program Proposal Summary

Project Title: Eastern Regional Network for Interactive Education (ERNIE): The University of Lowell Component

Institution: University of Lowell, College of Education

Type of Project: Student teleconferences, two-way audio and video, each 45 minutes (750 total teleconferences), and 50 teacher training teleconferences, 2 hours each.

Curriculum Area: Calculus II, Differential Equations, Earth Science, Chemistry, Physics, French and Spanish.

Teacher Training: Thinking Skills, Teaching in the Media Age, and Content Enhancement.

Target Audience: Teachers and students of grade levels 1-12.

Summary: To expand the University's Instructional Network to additional school districts where resources are especially limited and to extend the instructional design and staff development activity with particular emphasis on science, mathematics and science.

Collaborating Institutions: University of Massachusetts/Boston Institute for Learning and Teaching, Northeastern University, and the school systems of Chelmsford, Dracut, Lawrence, Lowell, Lynn, Tyngsboro, Concord, Littleton, Ayer, Westford, North Reading, Wakefield, and Lynnfield.

NORTHEAST STAR SCHOOLS PROGRAM

Program Proposal Summary

Project Title: Discrete Math

Institution: Northeastern University

Type of Project: Student telecourse and teacher professional development

Curriculum Area: Mathematics

Teacher Training: Develop series of workshops for teachers in discrete math and train teachers in use of telewriter.

Target Audience: High School students and teachers.

Summary: The first year includes developing lesson plans for video classes in discrete math, creating software for simulations, scripting and creating screens for interactive telewriter system. The second year would include the delivery of the course to school districts.

Collaborating Institutions: Boston English High School, Madison Park High School and Bellingham High School.

NORTHEAST STAR SCHOOLS PROGRAM

Program Proposal Summary

Project Title: Science News Digest

Institution: Northeastern University

Type of Project: Video enrichment for science classes including productions to be broadcast once a month during the school year on recent scientific advances.

Curriculum Area: Science

Teacher Training: Feedback from teachers receiving Science News Digest would be an integral component of the evaluation process.

Target Audience: 1,000 high school science students.

Summary: These productions would address a specific area in depth and would include interviews with researchers and discussion of the importance and potential application of the research. The goal is to bring these latest achievement in science directly into the classroom on a regular basis.

Collaborating Institutions: WGBH Educational Foundation, Boston English High School, Madison Park High School, and Bellingham High School.

NORTHEAST STAR SCHOOLS PROGRAM

Program Proposal Summary

Project Title:	A Distance Learning Project in Educational Technology
Institution:	Northeastern University
Type of Project:	Teacher professional development
Curriculum Area:	Educational technology/computers
Teacher Training:	Development workshops for teachers.
Target Audience:	Teachers in grades 1-12.
Summary:	In collaboration with computer teachers from the participating schools, Northeastern University will develop and broadcast six professional development workshops in educational technology.
Collaborating Institutions:	Madison Park High School, Boston English High School, and Bellingham High School.

NORTHEAST STAR SCHOOLS PROGRAM

Program Proposal Summary

Project Title: Video Enrichment for Consumer Math

Institution: Northeastern University

Type of Project: Video enrichment modules.

Curriculum Area: Consumer Math

Teacher Training:

Target Audience: Math students in grades 1-12.

Summary: In collaboration with Northeastern and WGBH, eight video enrichment modules will be produced for enrichment and remediation in consumer math.

Collaborating Institutions: WGBH Educational Foundation, Boston English High School, Madison Park High School and Bellingham High School.

NORTHEAST STAR SCHOOLS PROGRAM

Program Proposal Summary

Project Title: (26G)

Institution: Northeastern University

Type of Project: Telecourses with telewriter interaction.

Curriculum Area: Advanced French, German, Spanish, Russian and Japanese.

Teacher Training:

Target Audience: High school students.

Summary: To create and teach a video based advanced language telecourse with Telewriter interaction.

Collaborating Institutions: Boston Public Schools

NORTHEAST STAR SCHOOLS PROGRAM

Program Proposal Summary

Project Title:

Institution: Southeastern Massachusetts University

Type of Project: Student teleconferences, teacher training and course enhancement.

Curriculum Area: Distance learning and how to use it

Teacher Training: Three two-hour working teleconferences and a course enhancement team designed to complement the teleconferences.

Target Audience: Student and teachers of grade levels K-12.

Summary: Teleconferences for both teachers and students on course enhancement, course development, and course delivery information.

Collaborating Institutions: Southeastern Massachusetts University

NORTHEAST STAR SCHOOLS PROGRAM

Program Proposal Summary

Project Title:	New Approaches to Elementary Science and Mathematics Education
Institution:	Education Development Center, Inc.
Type of Project:	Teacher Training
Curriculum Area:	Science and Mathematics
Teacher Training:	Two teleconferences
Target Audience:	Teachers and students at the elementary level.
Summary:	To introduce members of the school community to two significant elementary curriculum development projects supported by the National Science Foundation and to integrate these programs into the school curriculum
Collaborating Institutions:	Boston College, Center for Study of Testing, Evaluation and Educational Policy and the Education Collaborative of Greater Boston.

NORTHEAST STAR SCHOOLS PROGRAM

Program Proposal Summary

Project Title:	Understanding and Addressing Low Achievement in Middle School Mathematics
Institution:	Education Development Center, Inc.
Type of Project:	Teacher training
Curriculum Area:	Mathematics
Teacher Training:	Six teleconferences, two hours each.
Target Audience:	Teachers of grade levels 5-9.
Summary:	The series of teleconferences will be a seminar for teachers on poor achievement in mathematics at the middle school level.
Collaborating Institutions:	Public schools of Boston, Cambridge, Chelmsford, Wayland, Waltham, and Newton.

NORTHEAST STAR SCHOOLS PROGRAM

Program Proposal Summary

Project Title: Using Technology to Teach for Understanding in High School Mathematics

Institution: Education Development Center, Inc.

Type of Project: Teacher training

Curriculum Area: Mathematics

Teacher Training: Two teleconferences, two hours each.

Target Audience: Teachers of grade levels 9-12.

Summary: This series of two teleconferences will introduce members of the school community to the ways in which technology can be used to transform the standard high school mathematics curriculum from rote learning of formulas and syntax to active investigation of dynamic systems and relationships.

Collaborating Institutions:

NORTHEAST STAR SCHOOLS PROGRAM

Program Proposal Summary

Project Title:	The Big Ideas
Institution:	Boston University
Type of Project:	40 hours of student teleconferences and 20 hours of teacher training.
Curriculum Area:	Mathematics and Science
Teacher Training:	Successful approaches to teaching basic math and science.
Target Audience:	Teachers and students of grade levels 6-8.
Summary:	Successful approaches to scientific and mathematical concepts will be introduced to middle school classes during live, televised presentations from a master teacher. Each presentation will be part of a module on a topic; each module will also include pre-recorded programming and print materials.
Collaborating Institutions:	Public schools of Boston, Brookline, Cambridge, and Newton.

NORTHEAST STAR SCHOOLS PROGRAM

Program Proposal Summary

Project Title: Math English Science Technology Education Project (MESTEP) Telecommunications

Institution: University of Massachusetts at Amherst, School of Education

Type of Project: Student and teacher training teleconferences.

Curriculum Area: Math and Science

Teacher Training: Eight teleconferences, 120 minutes each.

Target Audience: Teachers and students of grade levels 7-12.

Summary: Train college graduates with strong math and science skills to be effective telecommunications teachers and produce tape modules for use in the classroom. Conduct telecommunications seminars for school and professional development teams.

Collaborating Institutions: Acton High School, Lawrence High School, Worcester South High School, Holyoke High School, East Longmeadow High School and Greenfield High School.

NORTHEAST STAR SCHOOLS PROGRAM

Program Proposal Summary

Project Title: Sharing Teaching & Learning Techniques in Science Through Technology

Institution: Pittsfield Public Schools

Type of Project: Three student telecourses, three teacher telecourses and course enhancement.

Curriculum Area: Science

Teacher Training: Three teacher teleconferences.

Target Audience: Teachers and students of grade levels K-12.

Summary: Through the development of a Science Resources Bank and the dissemination of videotaped science lessons, sequential model science lessons would be prepared using the most successful learning techniques and experiences of teachers and students from participating school systems.

Collaborating Institutions: Pittsfield Public Schools, North Adams Public Schools, North Adams State College, and Central Berkshire Regional School District.

NORTHEAST STAR SCHOOLS PROGRAM

Program Proposal Summary

Project Title: Pioneer Valley Program in Foreign Languages

Institution: University of Massachusetts at Amherst

Type of Project: Interactive teacher training telecourses.

Curriculum Area: Foreign Languages including French, German, Latin, Portuguese and Spanish.

Teacher Training: Interactive teacher training telecourses in Foreign Languages.

Target Audience: Teachers of grade levels 10-12.

Summary: Objectives are to teach inductive methodology, create live cultural context, and practice listening and speaking foreign languages. Foreign language teachers will be trained and qualified to use video resources (often, live from international satellites) to teach student telecourses in year two.

Collaborating Institutions: School districts of Amherst/Pelham, Belchertown, Easthampton, Fall River, Granby, Hadley, Hampshire Regional, Hatfield, Holyoke, Northampton, Springfield, South Hadley, and Ware.

NORTHEAST STAR SCHOOLS PROGRAM

Program Proposal Summary

Project Title:	Planning and Development of a Telecourse on Statistical Process Control
Institution:	Institute for Governmental Services, University of Massachusetts at Amherst.
Type of Project:	Teacher training telecourses.
Curriculum Area:	Statistical Process Control
Teacher Training:	Three hours of teacher training telecourses.
Target Audience:	High School Math and Vocational teachers.
Summary:	To convene a team of personnel to plan, develop, test and implement a telecourse on Statistical Process Control for math and vocational teachers.
Collaborating Institutions:	Public schools of Holyoke, Fall River, Worcester, Joseph P. Keefe Technical School, University of Massachusetts Graduate School, Holyoke Community College, and Massachusetts Bay Community College.

NORTHEAST STAR SCHOOLS PROGRAM

Program Proposal Summary

Project Title: Enhancing Public School Curriculum in Math and Science Via Telecoursing/Teleconferencing

Institution: Springfield Technical Community College (STCC)

Type of Project: 120 student teleconferences, four teacher teleconferences, and course enhancement.

Curriculum Area: Science and Mathematics

Teacher Training: In-service training concerning the effective use of all the instructional media and technology to be utilized during the four telecourses.

Target Audience: Teachers and students of grade levels 8-9 math, and 5-12 science.

Summary: To enrich course curriculum via telecourses/teleconferences taught by STCC faculty and adjunct personnel using video and computer-based instructional systems in conjunction with print materials.

Collaborating Institutions: School systems of Springfield, Agawam, Chicopee, East Longmeadow and Holyoke.

NORTHEAST STAR SCHOOLS PROGRAM

Program Proposal Summary

Project Title: Museum of Science Pre-Visit Planning and Teacher Training

Institution: Museum of Science

Type of Project: Teacher training

Curriculum Area: Science

Teacher Training: Telecourses supplemented with course enhancement.

Target Audience: Teachers and students of grade levels K-12.

Summary: The Museum's elementary teacher training programs will be piloted as telecourses to the 10 communities supplemented by museum kits and on-site visits. Curriculum enrichment will also be offered to students at the Museum in the form of introductory videos.

Collaborating Institutions: Public Schools of Lynn, Brockton, Somerville, New Bedford, Chelsea, Malden, Worcester, Lawrence and Everett.

Appendix 8

MCET Board of Directors and Advisory Council

MASSACHUSETTS CORPORATION FOR EDUCATIONAL TELECOMMUNICATIONS

BOARD OF DIRECTORS

(As of March 20, 1989)

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President, Emerson College

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President, Holyoke Community College

Henry P. Becton, Jr. §
President, WGBH Educational Foundation

Helen A. Donohue, Secretary *
Attorney

Eileen T. Farley
President, Bristol Community College

Grady Hedgespeth §
Secretary, Executive Office of Economic Affairs

Franklyn G. Jenifer §
Chancellor, Board of Regents

David C. Knapp *§
President, University of Massachusets

Jack Luskin §
Director of Training
Work Environment Laboratory, University of Lowell

Vincent J. Mara, Jr.
President, Fitchburg State College

Harold Raynolds, Jr. §
Commissioner of Education

Frederick D. Royal
Professor, Western New England College

Kenneth G. Ryder *
President, Northeastern University

John R. Silber *
President, Boston University

Charles C. Tretter
General Counsel, New England Governor's Conference

Richard A. Borten
Executive Director

Lowell L. Richards, III
Treasurer

James E. Samels
Counsel

* denotes Executive Committee Member
§ denotes Ex Officio Member

MASSACHUSETTS CORPORATION FOR EDUCATIONAL TELECOMMUNICATIONS

ADVISORY COUNCIL

***Jack Luskin**, Chairman*
Director of Training, Work Environment
Laboratory, University of Lowell

Carrie Buckner
Staff Assistant, Holyoke Community
College

Joseph J. Bryne
Associate Provost, Tufts University

Linda Dagradi
Financial Aid Director, Springfield College

Armand Desmarais
Dean of Continuing Studies and Professor
of Education, Southeastern Mass.
University

Paul Devlin
President, Massachusetts Federation of
Teachers

Barbara Farrell
Supervisor, Community Based Program,
Baystate Medical Center

Nancy Finklestein
Director, Mass. Cultural Alliance
Former President, Massachusetts Teachers
Association

Judith Kurland
Commissioner, Department of Health and
Hospitals

Patricia Mirisola
Clinical Manager, Greater Lawrence Family
Health Center

Robin C. Smith
Community Relations Coordinator
Children's Study Home

Paul A. Tamburello
Justice, Massachusetts Superior Court

Appendix 9

Existing MCET Staff

Existing MCET Staff

Richard A. Borten, MCET's executive director, has overall responsibility for the design and implementation of the MCET network. Named as MCET's first executive director in 1983, Mr. Borten has overseen MCET's program development and network planning efforts. Previously Mr. Borten administered the City of Boston's cable television development process and worked with more than a dozen Massachusetts municipalities in their cable development efforts. He previously served as the executive director of both the City of Boston and Commonwealth of Massachusetts consumer protection agencies. He was an Associate Professor at the University of Massachusetts and a lecturer at Boston University.

Linda DiRocco, Deputy Director for Operations and Development, will be responsible for the operation of the MCET network and development of programming. Ms. DiRocco has more than 12 years experience in providing cultural, civic and educational organizations with training in the applications of technology to education. Since 1985, she has been responsible for development, implementation and evaluation of MCET's Technical Assistance Program, providing interactive telecommunications services to a wide variety of institutions. Previously she directed media-related projects for the Cultural Education Collaborative, Urban Planning Aid, the City of Somerville Education Project and the University of Massachusetts Prison Program. She is a former instructor in video production and cable television at Antioch College.

Ruth Ferguson, Deputy Director for Administrative Services, will manage the Corporation's business, legal and financial affairs. Ms. Ferguson has served as Controller and Chief Financial Officer of the Corporation since 1984. She previously worked with Warner-Amex Cable Communications Company in an administrative and planning role, and on the staff of the Massachusetts House of Representatives. Ms. Ferguson holds a B.A. from Cornell University and an M.B.A. from Boston University.

Martin Kessel, Research Manager, will oversee needs assessments and coordinate information resources. MCET's Research Manager since 1984, Mr. Kessel supervised the drafting of numerous research reports and network proposals. He was founder and president of the Cable Television Access Coalition and serves as a Trustee of the Boston Community Access and Programming Foundation. He previously worked as a radio news reporter and producer. Mr. Kessel holds an A.B. from Brandeis University and an M.S. in Broadcasting from Boston University.

Jamie K. Neithold will serve as Senior Associate for Operations and Services, responsible for the development of locally produced distance learning projects and assistance with program acquisition. MCET's Project Services Coordinator since 1986, Ms. Neithold has coordinated the implementation of demonstration projects through MCET's Technical Assistance Program. She previously was Educational Programming Coordinator for Somerville Community Access Television. She has experience in all aspects of video production. She has a B.S. in Advertising/Marketing from Boston University.

Christine A. Proodian, Public Information Coordinator, is responsible for MCET's public relations efforts and provides research support. Prior to joining MCET in 1987, Ms. Proodian was a Statistical Analyst for a market research firm. She received a Bachelor of Arts in English/Communications from Emmanuel College.

Appendix 10

Five-Year Network Budget

FIVE YEAR BUDGET

	YEAR ONE	YEAR TWO	YEAR THREE	YEAR FOUR	YEAR FIVE	TOTAL
USES OF FUNDS						
OPERATING EXPENSES						
PERSONNEL						
Salaries & Wages	455,417	555,688	608,472	638,895	670,840	2,929,312
Fringe	81,975	100,024	109,525	115,001	120,751	527,276
CONTRACTUAL SERVICES						
Legal Services	75,000	78,750	82,688	86,822	91,163	414,422
Data network design	5,000	0	0	0	0	5,000
Maintenance	45,000	72,000	93,600	111,600	111,600	433,800
Accounting	15,000	18,000	21,600	25,920	31,104	111,624
Miscellaneous	5,000	5,500	6,050	6,655	7,321	30,526
GENERAL & ADMINISTRATIVE						
Travel	50,000	55,000	60,500	66,550	73,205	305,255
Insurance & Bonding	40,000	50,000	52,500	55,125	57,881	255,506
Office Supplies	20,000	25,000	26,875	28,891	31,057	131,823
Technical Supplies	5,000	10,000	10,000	10,000	10,000	45,000
Printing	50,000	57,500	66,125	76,044	87,450	337,119
Postage & Shipping	20,000	23,000	26,450	30,417	34,980	134,848
Equipment & Furniture	55,000	35,000	20,000	15,000	15,000	140,000
Telephone	50,000	60,000	72,000	86,400	103,680	372,080
Rent	85,000	40,000	40,000	40,000	40,000	245,000
Electricity	4,550	4,550	4,550	4,550	4,550	22,750
Local Area Network	9,000					9,000
Photocopier Lease	7,500	7,500	7,500	7,500	7,500	37,500
Auto Lease	3,500	4,000	4,000	4,000	4,000	19,500
Meetings & Conferences	20,000	21,000	22,050	23,153	24,310	110,513
Other Expenses	25,000	25,000	25,000	25,000	25,000	125,000
TELECOMMUNICATIONS LEASES						
Satellite Transponder	120,000	250,000	500,000	750,000	1,000,000	2,620,000
Microwave - Lowell/Boston	30,000	30,000	30,000	30,000	30,000	150,000
Audioconferencing WATS lines	66,469	137,945	511,190	746,491	979,289	2,441,384
Data Network Transmission		64,214	89,300	114,386	126,929	394,829
Uplinking - E. Mass.	48,000	128,000	250,000	375,000	500,000	1,301,000
Uplinking - W. Mass.	27,000	45,800	93,800	140,600	187,500	494,700
Mobile Satellite Uplink	20,000	40,000	50,000	60,000	70,000	240,000
PROGRAM ACQUISITION FUND	250,000	500,000	500,000	500,000	500,000	2,250,000
TOTAL OPERATING	1,688,411	2,443,471	3,383,775	4,173,999	4,945,111	16,634,767

	YEAR ONE	YEAR TWO	YEAR THREE	YEAR FOUR	YEAR FIVE	TOTAL
NETWORK DEVELOPMENT EXPENSES						
SATELLITE RECEIVE EQUIPMENT						
Institutional Sites	550,000	275,000	275,000	275,000		1,375,000
Local Distribution Networks	262,500	262,500	105,000			630,000
CLASSROOM EQUIPMENT	300,000	250,000	240,000	220,000	120,000	1,130,000
MICROWAVE LINKS -portable	30,000					30,000
WESTERN MASS. HUB						
Upgrade uplink	30,000					30,000
Switching Center		112,619				112,619
Prod'n/Editing Facility	299,525					299,525
Satellite Receive Equipment	30,000					30,000
Microwave Connection		150,000				150,000
DATACOMM TURNKEY SYSTEM		25,430	172	172	86	25,860
AUDIOCONFERENCING BRIDGE	60,860		860			61,720
Sub-Total	1,562,885	1,075,549	621,032	495,172	120,086	3,874,724
SPARE PARTS	62,515	105,537	130,379	150,186	154,989	603,606
TOTAL NETWORK DEVELOPMENT	1,625,400	1,181,086	751,411	645,358	275,075	4,478,330
TOTAL USES OF FUNDS	3,313,812	3,624,557	4,135,186	4,819,357	5,220,185	21,113,097
SOURCES OF FUNDS						
USER FEES						
MEMBERSHIP						
Access Fee	156,000	296,000	278,000	278,000	236,000	1,244,000
Subscription		109,680	163,520	219,520	260,800	753,520
PROGRAM ACQUISITION FUND		500,000	500,000	500,000	500,000	2,000,000
TRANSMISSION SERVICES						
Space Segment	40,000	250,000	500,000	750,000	1,000,000	2,540,000
Portable Microwave Lease	2,000	5,000	10,000	10,000	15,000	42,000
Mobile Uplink	20,000	40,000	50,000	60,000	70,000	240,000
Uplinking Services						
Eastern Mass.	48,000	128,000	250,000	375,000	500,000	1,301,000
Western Mass.	54,000	91,600	187,600	281,200	375,000	989,400
Audioconferencing Services	18,000	112,500	225,000	337,500	450,000	1,143,000
TOTAL USER FEES	338,000	1,532,780	2,164,120	2,811,220	3,406,800	10,252,920
STATE APPROPRIATION	3,144,812	2,689,167	2,286,736	2,331,687	2,111,175	12,563,577
TOTAL SOURCES OF FUNDS	3,482,812	4,221,947	4,450,856	5,142,907	5,517,975	22,816,497

BUDGET EXPLANATION

USES OF FUNDS

OPERATING EXPENSES

PERSONNEL

Salaries and Wages

Year One:	
Existing MCET Personnel	
Exec. Director	
Deputy Director Operations & Development	
Deputy Director Administration	
Research Manager	
Public Information Coordinator	
Public Affairs Coordinator	
Secretary	
TOTAL	217,916.98
Additional Personnel	
Deputy Director Engineering Srvcs	55,000.00
Engineering Associate	35,000.00
Assoc. for Mktg/Member Relations	30,000.00
Audioconf. Bridge Operator (1/2 Time)	12,500.00
Secretary	23,000.00
Bookkeeper	28,000.00
TOTAL	455,417.00
Year Two:	
Yr. 1 pos'ns w/5% salary adjustment	478,187.83
Additional Personnel	
Operations & Services Assoc.	30,000.00
Data Systems Operator	35,000.00
Audioconf. Bridge Operator (1/2 Time)	12,500.00
TOTAL	555,687.83
Year Three:	
Yr 2 pos'ns w/5% salary adjustment	583,472.25
Additional Personnel	
Audioconf. Bridge Operator	25,000.00
TOTAL	608,472.25
Year Four:	
Yr 3 pos'ns w/5% salary adjustment	638,895.85

Year Five:

Yr 4 pos'ns w/5% salary adjustment	670,840.65

Fringe

Fringe benefits are equal to 18% of salaries and wages. Included in fringe are contributions to an employer funded SEP-IRA pension system in the amount of 10% of gross salary; and insurance benefits including group health, life, long term disability.

CONTRACTUAL SERVICES

Legal

MCET anticipates extensive legal work asssociated with establishment of the network due to the large number of separate contracts that will be negotiated. Legal costs are projected at $75,000 in Year 1, to increase at the rate of 5% per year.

Data Network Design

In Year 1 MCET will contract for the design of the data communications network for a cost of $5000.

Maintenance

MCET will be maintaining the satellite receive dishes (TVROs) at a unit cost of $360. The annual costs will be:

	# of TVROs	TVRO Cost
Year 1:	125	45,000
Year 2:	200	72,000
Year 3:	260	93,000
Year 4:	310	111,000
Year 5:	310	111,000

Accounting

MCET's anticipated expenditures for independent accounting and auditing services is $15,000 in Year 1 based on 1.5 times the Corporation's current accounting budget, increasing by 20% in each subsequent year due to the increasing complexity of business and financial matters.

Miscellaneous

MCET projects the expenditure of $5000 in Year 1 on miscellaneous contractual services, increasing by 10% per year thereafter to cover increased operations and increasing costs.

GENERAL AND ADMINISTRATIVE

Travel

The Year 1 travel budget of $50,000 will fund extensive travel around the state to potentail receive sites; future years' travel expenditures will increase by 10% per year.

Insurance and Bonding

Insurance and bonding costs are projected to be $40,000 in Year 1, increasing by 25% in Year 2 due to the extensive network development activity in those first years. Costs for Years 3 through 5 are projected to increase by 5% per year.

Office Supplies

Expenditures for office supplies will be $20,000 in Year 1, increasing by 25% in Year 2, as the administrative structure of the network is put in place. In Years 3 through 5 costs will increase by 7.5% per year.

Technical Supplies

Expenditures for supplies associated with technical operations, such as videotapes, cables, etc. will be $5000 in Year 1, doubling to $10,000 in Year 2 and remaining constant thereafter.

Printing

Costs associated with the printing of course-related materials, catalogs and brochures, as well as general office copying needs are projected to be $50,000 in Year 1, increasing by 15% per annum thereafter.

Postage and Shipping

Mailings of informational materials and general mailing and delivery charges are projected to cost:

Year 1	20,000
Year 2	23,000
Year 3	26,450
Year 4	30,417
Year 5	34,980

Equipment and Furniture

MCET anticipates major equipment and furniture purchases in Years 1 and 2 ($55,000 and $35,000 respectively) as the network operations get underway. In subsequent years expenditures are projected to be:

Year 3	20,000
Year 4	15,000
Year 5	15,000

Telephone

Expenditures for general and administrative telephone service are projected to be $50,000 in Year 1 due to the need for extensive telephone contact with institutions throughout the state regarding network operations and programs. Thiis amount is projected to increase 20 percent in each subsequent year, as network operations expand.

Rent

Space requirements for administrative and operational activities are projected to be 4000 square feet. Year 1 expenditures will be $25 per square foot for the first nine months, dropping to $10 per square foot thereafter, since MCET anticipates moving to lower cost space when its present lease expires (3/31/90). Subsequent years' expenditures will remain steady at $40,000 per year.

Electricity

Current MCET electricity costs are calculated at 4.55% of rental costs. Assuming no concurrent drop in electricity costs when MCET moves to less expensive office space, electricity costs have been budgeted to hold steady at $4550 per year.

Local Area Network

When MCET moves to its lower cost location in Year 1, a local area network, connecting all administrative computer equipment will be installed. This will cost $9000.

Photocopier Lease

MCET projects its costs for leasing photocopying equipment will be $7500 per year (twice present costs).

Auto Lease

MCET's current auto lease agreement in the amount of $3500 per year expires in FY90. A new lease agreement is projected to increase costs to $4000 per year.

Meetings and Conferences

MCET anticipates holding many meetings throughout each year as the network is developed. Costs for those meetings is projected to be $20,000 in Year 1, increasing by 5% per year thereafter.

Other Expenses

MCET has established a fund in the amount of $25,000 per year to cover the costs of miscellaneous expenses.

TELECOMMUNICATIONS LEASES

Satellite Transponder

MCET will be leasing satellite transponder time at the rate of $200 per hour, based on an agreement to sublease, at cost, New York Network capacity at NYN's bulk purchase rate. Projected annual usage and cost is:

Year 1	600 hours	$120,000
Year 2	1250 hours	250,000
Year 3	2500 hours	500,000
Year 4	3750 hours	750,000
Year 5	5000 hours	1,000,000

Microwave - Lowell/Boston

Beginning in Year 1 MCET will lease a three-hop microwave connection between the University of Lowell and a satellite uplink in Boston, at an annual cost of $30,000.

Audioconferencing WATS Lines

MCET will install in-coming WATS lines for participants in the audioconferencing component of telecommunications programs. In Year 1 ten lines will be installed; ten additional lines will be installed in Year 3. The following is the projected annual expenditure for this service:

	# Lines	COST
Year 1	10	66,469
Year 2	10	137,945
Year 3	20	511,190
Year 4	20	746,491
Year 5	20	979,289

Data Network Transmission

When the data communications network goes online, MCET intends to install in-coming WATS lines according to the following schedule:

	# Lines	COST
Year 2	5	62,714
Year 3	7	87,800
Year 4	9	112,886
Year 5	10	125,429

MCET's data network consultant will explore whether costs can be lowered through the use of alternatives to WATS, such as commercial packet-switched networks or the Board of Regents Higher Education Communications Network (HECN).

Uplinking - Eastern Massachusetts

MCET will be paying for the use of satellite uplinking facilities in Eastern Massachusetts at the rate of $200 per hour, according to the following schedule:

Year 1	240 hours	$ 54,000
Year 2	640 hours	144,000
Year 3	1250 hours	281,250
Year 4	1875 hours	421,875
Year 5	2500 hours	562,500

Uplinking - Western Massachusetts

MCET will be paying for the use of satellite uplinking facilities in Western Massachusetts at the rate of $100 per hour, for those hours of programming not produced by the University of Massachusetts which owns and operates the uplink. Western Massachusetts uplinking costs are as follows:

Year 1	270 hours	$ 27,000
Year 2	458 hours	45,800
Year 3	938 hours	93,800
Year 4	1406 hours	140,600
Year 5	1875 hours	187,500

Mobile Satellite Uplink

MCET projects usage of mobile satellite uplinking services at the going rate of $2000 per day as follows:

Year 1	10 days	20,000
Year 2	20 days	40,000
Year 3	25 days	50,000
Year 4	30 days	60,000
Year 5	35 days	70,000

PROGRAM ACQUISITION FUND

A Program Acquisition Fund has been established for the acquisition of currently available programs based on the needs expressed by Massachusetts institutions. The Fund will be $250,000 in Year 1 and $500,000 in each year thereafter. See Programming section in text for details.

NETWORK DEVELOPMENT EXPENDITURES

Satellite Receive Equipment

Satellite receiving dishes (Television Receive Only, or TVRO) will be installed at single sites such as public schools and health care institutions and at local distribution networks such as cable television systems. The unit cost of single site TVRO's is $5500; the unit cost of local distribution network TVRO's is $10,500. These prices include the antennas (dishes), all electronics and installation. MCET will be installing TVRO's at the following rate:

Single Site:		
Year 1	100	550,000
Year 2	50	275,000
Year 3	50	275,000
Year 4	50	275,000

Local Distribution Network:

Year 1	25	262,500
Year 2	25	262,500
Year 3	10	105,000

Classroom Equipment

MCET will install integrated audio-visual (AV) systems in one classroom at each institution connected to the network. The systems will consist of an AV unit cabinet; video monitor; cordless telephone; Video Cassette Recorder (VCR); and associated shipping, assembly, installation and tests. Each integrated system will cost $2000. Total systems installed and total cost per year is as follows:

Year 1	150	300,000
Year 2	125	250,000
Year 3	120	240,000
Year 4	110	220,000
Year 5	60	120,000

Portable Microwave Link

MCET will purchase two pair of portable microwave dishes in Year 1 at a total cost of $30,000.

Western Massachusetts Hub

MCET anticipates the following expenditures in Year 1 for improvements to the Western Massachusetts network hub site:

Upgrade of existing uplink to add steerability	30,000
Switching Center development	112,619
Production/Editing Facility	299,525
Satellite Receive Equipment - C and Ku Bands	30,000
Two-way Microwave Connection-Mt. Tom	150,000

Local Interactive Networks

Beginning in Year 2 MCET will develop local interactive networks, connecting cable television systems to one another so that programming can be distributed and received at many sites in several surrounding communities at one time. Each local interactive network will cost an average of $275,000. MCET anticipates the following development schedule:

Year 2	2	550,000
Year 3	5	1,375,000
Year 4	5	1,375,000
Year 5	5	1,375,000

Data Communications Package

MCET will be offering data communications services beginning in Year 2 of network operation. An electronic bulletin board service will be purchased in Year 2 at a cost of $25,000 for a turnkey system including computer, ports and software, and an annual licensing fee of $1500.

Audioconferencing Bridge

MCET will be installing an audioconferencing bridge dedicated to network use in Year 1 at a cost of $60,000.

Spare Parts

MCET calculates the cost of spare parts for network equipment to be four percent of total cumulative equipment costs, broken down as follows:

	Equip. Cost	Spare Parts Cost
Year 1	1,562,025	62,481
Year 2	2,637,574	105,503
Year 3	3,257,746	130,310
Year 4	3,752,918	150,117
Year 5	3,873,004	154,920

SOURCES OF FUNDS

USER FEES:

Membership:

Membership revenues include the one-time access fee, and annual membership fee payable by network members. These fees are:

Non-Profit:

One time access fee	$2000 per equipped classroom, payable over two years
Annual membership fee	$360 per classroom

Business:

One time access fee	$8000 for the first classroom, $2500 per each additional classroom at the same address, payable over two years
Annual membership fee	$2000 per year, per classroom

In projecting membership fee revenues, MCET has assumed that all members will elect to pay the one time access fee over two years. In addition, first year members will not be required to pay the annual fee for Year 1. The following schedule reflects the numbers of new members each year, the total membership, and the projected revenues, annually:

	New Members	Total members	Revenues
Year 1	148 non-profit, 2 business	150	156,000
Year 2	120 non-profit, 5 business	275	405,680
Year 3	114 non-profit, 6 business	395	441,520
Year 4	100 non-profit, 10 business	505	497,520
Year 5	48 non-profit 12 business	565	496,800

Program Acquisition Fund:

Through the Program Acquisition Fund, network members will be able to purchase or license distance learning services such as telecourses, teleconferences and on-line data services at discounted, group rates. MCET projects revenues equal to expenditures of the Program Acquisition Fund during years 2 - 5.

Space Segment:

During Year 1 of network development, MCET plans to provide 400 hours of satellite delivered distance learning services acquired through the Program Acquisition Fund at no cost to network members. The remaining 200 hours of satellite delivered programs will result in $40,000 revenues.

During years 2 - 5 MCET projects revenues equal to expenditures for space segment.

Portable microwave:

Portable microwave equipment will be available to network members at $250 per half-day. This price includes a technician as well as installation and use of the equipment.

This equipment will enable network members to transmit live video from sites locates within a 3 to five mile radius of network uplinking facilities. MCET projects revenues generated from the rental of this equipment according to the following schedule:

Year 1	2,000
Year 2	5,000
Year 3	10,000
Year 4	10,000
Year 5	15,000

Mobile uplink:

Use of a mobile uplink will enable network members to transmit live video from any site. MCET will identify and contract with mobile uplink vendors based on the best offer, and bill back network members at cost. MCET projects revenues equal to expenditures for this category throughout the five year development period.

Uplink Service:

MCET will use uplinking services in eastern and western Massachusetts. In eastern Massachusetts, revenues will be equal to expenditures of $200 per hour. Revenues generated from the western Massachusetts facility are calculated at $200 per hour for 75% of the total western Massachusetts program hours. The remaining 25% are projected services required by the Unversity of Massachusetts at Amherst. Uplink service revenues have been calculated according to the following schedule:

	Eastern MA	Western MA
Year 1	20,000	15,000
Year 2	125,000	93,750
Year 3	250,000	187,500
Year 4	375,000	281,250
Year 5	500,000	375,000

Audioconference:

MCET projects that 90% of the video based network programming will be interactive, requiring audioconference service. Audioconference service will be available to network members at $10 / hour/line, for "800" number call-in service. Revenues have been projected based on the assumption that an average of 10 sites will participate in each interactive program. During Year 1, MCET will provide full program service for programs acquired through the Program Acquisition Fund. Of the remaining 200 hours, 180 hours will require audioconference service, resulting in $18,000 revenues. During the following years, revenues have been projected according to the following schedule:

Year 2	1125 hours	112,500
Year 3	2250 hours	225,000
Year 4	3375 hours	337,500
Year 5	4500 hours	450,000

STATE APPROPRIATIONS:

MCET is seeking appropriations from the Commonwealth to make up the difference between user revenues and network costs. MCET's cash flow assumes that half of a given year's user revenues will be available to cover MCET expenses during that fiscal year; the remainder will be available the following year. This assumption has determined MCET requirements for state funding each year.

MCET is projecting the following needs for state funds:

Year 1	3,114,812
Year 2	2,659,167
Year 3	2,256,736
Year 4	2,301,687
Year 5	2,081,175

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